C8650-4

Volume 63, Number 4
April 1985

09435 1984301 W 3 1962
SUITE 800 COPY # 1
CONGRESSIONAL INFO SERVIC D
4520 EAST WEST HWY STE 80
BETHESDA MD 20814

Electric Light & Power

THE NEWS MAGAZINE OF ELECTRIC UTILITY MANAGEMENT AND TECHNOLOGY

©TECHNICAL PUBLISHING

The D. B. Wilson coal-fired generating unit in Ohio County, Kentucky. Alleging repayment default of REA loans, the government wants to foreclose on the plant. The owner, Big Rivers, says REA precipitated the default.

Big Rivers G & T co-op says Justice Department sued with 'unclean hands'

HENDERSON, KY—Big Rivers Electric Corporation has responded to the January U.S. Justice Department foreclosure suit, charging that the federal government "does not come into court with clean hands." Therefore Big Rivers concludes the government is not entitled to relief.

Big Rivers argues that the combination of declining load growth in its territory, a change in federal energy policy, and especially the refusal of the Rural Electrification Administration to live up to its funding agreements, have caused the financial shortfall that put the utility in default of its loan accord.

In January, the Department of Justice filed a civil complaint in U.S. District Court for the Western District of Kentucky charging that Big Rivers was in default on more than $1 billion in loans guaranteed by the REA. The complaint seeks to recover all of its money, focusing primarily on the 440 MW D.B. Wilson-1 coal-fired generating unit that went into service last September. According to acting assistant attorney general Richard K. Willard, this plant and other utility assets are mortgaged to the government. The suit seeks to foreclose on those mortgages.

In a release to the press, the Justice Department noted that the cooperative has been exploring the possibility of merging with the East Kentucky Power Cooperative, Inc. and that it "hoped an economically feasible merger or other satisfactory solutions could be achieved, notwith-

Continued on page 2

Electric utility industry financial status improves

NEW YORK—The earnings of investor-owned electric utilities improved in 1984, with actual earned return on equity averaging an estimated 14.4 percent compared with 14.35 percent in 1983.

According to statistics compiled by the Edison Electric Institute, last year earned returns on equity ranged from 7.1 percent to 20.8 percent.

These and other financial data were reported in mid-February to the New York Society of Security Analysts by EEI president William McCollam, Jr.

On average, electric utilities sought a return on equity of 16.2 percent last year, and were granted an average allowed rate of about 15.2 percent, McCollam said. The 14.4 percent earned return is therefore less than that allowed, which, in turn, is said to be less than the true cost of capital.

There were 80 announced dividend increases last year, compared to a total of 93 in 1983. "Given the construction issues and the financial distress caused by such issues for a number of our companies, it is prudent to anticipate that the dividend policies of the past will be tested during the next few years," McCollam told securities analysts here.

Pre-tax interest coverage of 3.16 was above the 1983 level of 3.06. This parameter ranged from 1.9 to 7.0.

At year end, the market price to book value of utility stock stood at 98 percent on average, McCollam said, compared to 94 percent in 1983. This increase was based on an analysis of

Continued on page 2

Effects of time-of-day rates reported as slight

In a new study, only one in eight investor-owned electric utilities reports any effect on electricity demand from residential time-of-use rates.

In the commercial sector, the result was slightly less than one in seven.

And of 57 investor-owned electric companies reporting to the Electric Power Research Institute (EPRI) that they had implemented T-O-D rates for industrial loads, only 11—just under one in five—said they had measured an impact on class demand.

The EPRI *Innovative Rate Design Survey* of 221 electric utility organizations is said to be the first systematic examination in nearly a decade of how utilities implement and use innovative rate designs.

With responses from 158 utilities, EPRI says the report "is a valuable resource for utilities considering nontraditional pricing programs." Its objective was to document and summarize the types of innovative rate structures now being offered by electric utilities throughout the U.S.

According to the survey, a time-of-use rate is one where one or more of its elements is priced differently for different periods of usage during the day.

While the data show the effects of time-of-use rates on electricity demand to be slight, EPRI researcher John Chamberlin warns against such an unqualified conclusion.

Chamberlin, who was the project manager for the survey, said that the survey questionnaire asked each utility respondent if the implementation of the time-of-use rate had an impact on class load. Thus, he said, many time-of-use rates implemented for small groups of customers—while they may have had a measurable impact on that group's use of electricity—did not affect the overall class of customers.

Also, Chamberlin said that innovative rates often are implemented by utilities under conditions that are less rigorous than those of social experiments so that the effect of the rates on electricity demand can be masked by other factors that influence demand. These include, for example, changes in the number of household residents, greater or lesser family affluence, and the addition of new appliances.

Notwithstanding these cautions, EPRI's Chamberlin notes, "It is fair to say that utilities with residential time-of-day rates are having a hard time saying what the impact is."

For the overall survey EPRI received responses from about 75 percent of the 158 investor-owned utilities contacted and from about 56 percent of the 63 publicly-owned utilities queried. Time-of-day rates were found to be the most widely used of all innovative rate types. Nearly 70 percent of all respondents offered at least one T-O-D rate.

Of the publicly-owned utilities survey by EPRI, eight utilities offered time-of-use rates to residential customers, eight utilities offered such rates to commercial customers, and nine offered them to industrial customers. Impacts were found to be measurable in two cases for each of the utilities offering such rates in that customer class.

Interruptible/curtailable rates are the second most common innovative rate design implemented, EPRI reports. About half the respondents reported offering such a rate, most often to industrial customers. An interruptible/curtailable rate is one where

Continued on page 6

Foreign Power Briefs

● **The Soviet Union** said it will allow the International Atomic Energy Agency (IAEA) to inspect some of its nuclear reactors. *The Wall Street Journal* reported that the chairman of the Soviet Union's Atomic Energy Commission and the director general of the IAEA signed an agreement in February. According to the newspaper, the Soviet Union will not allow inspection of its more advanced reactors. A Soviet statement said the agreement showed Moscow's commitment to arms limitation and disarmament. *The Wall Street Journal* said that while other countries allow IAEA inspections of advanced facilities, Moscow's list included smaller reactors that were technologically outdated.

● **Pakistan** and the United States Agency for International Development have hired Gilbert/Commonwealth International Inc. to conduct a power feasibility study of the Lakhra Coal Mine and Power Generation Project near Jamshoro. Project plans call for construction of a 300 MW coal-fired plant. Gilbert-/Commonwealth said it will determine the type of plant best suited to burn Lakhra lignite grade coal, which has a high moisture and sulfur content. The entire project is expected to cost $815 million.

● **The People's Republic of China** has awarded contracts worth $28 million to General Electric Company for the construction of two MS6001 heavy-duty gas turbines and other turbine parts. GE said one of the gas turbines will be part of a repowering project in Karamay in northwest China, and the other will be used for a cogneration plant in Daqing in northeast China.

● **The Soviet Union** has agreed to help Syria construct its first nuclear power plant. The Syrian Arab News Agency, Sana, reports that Syria's Electric Power Minister announced the accord after returning from a recent visit to Moscow. The Russians have apparently chosen three potential sites for the plant and an agreement has been signed for geological and geophysical surveys.

● **Electricity demand in Canada** rose more than 8 percent last year, according to a survey conducted by the Canadian Electrical Association. Even though demand is up, the CEA said Canada still has surplus energy available for export. In the first nine months of 1984, energy exports increased 9.9 percent from the same period in 1983.

● **Key government, utility and industry officials in India** met with a U.S. delegation of ten renewable energy experts in February to hear how U.S. utilities have used renewable energy for power generation. The group met with officials in New Delhi, Calcutta, Madras and Bombay. Representatives from Southern California Edison, Pacific Gas & Electric, Sacramento Municipal Utility District and Georgia Power Company participated in the trip.

● **More electrical companies** went into liquidation in England and Wales last year than ever before, reports Dun & Bradstreet. A survey showed that 793 electrical firms liquidated last year in the two countries, an increase of 4.9 percent from 1983. Dun & Bradstreet reports that 121 electrical firms declared bankruptcy, up 19.8 percent from the previous year.

● **Japan and China** have agreed to exchange information on nuclear power, fusion, recovery of uranium from seawater and the use of nuclear heat. *Nuclear International Engineering* reports that a Chinese delegation will visit Japan sometime this year.

In This Issue

Editorial 4

Calendar 9

The Edison Electric Institute has advanced numerous strategies to revive the nuclear option. But critic Amory Lovins says financial health and energy reliability will be maintained if nuclear plants are abandoned. A point/counterpoint examines the two sides. 16

Seminars to help computer users deal with power quality problems are being sponsored by several utilities. T/D 25

Electron-beam irradiation testing at Indianapolis Power & Light Company's E.W. Stout station should get underway sometime this month. The exotic technology removes sulfur and nitrogen oxides simultaneously from flue gases. G 33

A SCADA system was upgraded quickly, while on-line, pending installation of a new energy management system. T/D 36

New Products 46

New Literature 49

Readers' Service 51

Regulatory Review 53

Advertisers' Literature 55

Personnel 56

Management Methods 58

EL&P readers whose responsibilities include both Generation and Transmission/Distribution receive both technology sections. Other readers receive the technology section that applies to their respective area of responsibility. The Generation edition is indicated by a single dot (•) in the upper right corner of page 1; the T/D edition carries two dots (••). All readers receive EL&P's industry news section.

Financial status improves . . . from page 1

100 major electric utility systems.

Rate increases in 1984 showed a decline from the year before. Preliminary data indicate that the investor-owned electric utilities received 184 increases totaling about $4.83 billion, compared to 241 increases totaling $5.373 billion in 1983. These increases, McCollam said, do not include fuel clause adjustments.

As of December 31, 1984, EEI estimates that pending applications for rate relief total about $7.8 billion. The corresponding figure for 1983 was $9.674 billion.

"It is prudent," McCollam said, "to expect that an issue which will dominate many future rate cases will be that of phase-in. As a principle for rate-setting, we at EEI have come out against phase-in which excludes inclusion of CWIP [construction work in progress] in the rate base. But we recognize that local considerations exist which may require the phaseing in of major generating units."

During 1984, the investor-owned electric utility industry spent $28.1 billion on new electric plant, including nuclear fuel. With $6.8 billion added to this figure for allowance for funds used during construction (AFUDC), construction expenditures totaled $34.9 billion.

AFUDC is the calculated return utilities accrue on the funds they have invested in construction projects. The accrual is an accounting measure that becomes actual cash when the construction project becomes operational and goes into rate base.

EEI estimates that companies plan to spend $31.9 billion this year, $28.5 billion in 1986, and $25.1 billion in 1987. These figures include AFUDC and reportedly assume a construction cost escalation rate of about 6 percent.

McCollam said that to accomplish a construction program of this size, some $26 billion—or about 34 percent of the total cash construction requirements—will have to be raised from outside sources over the next three years. On an annual basis, this amounts to $12.0 billion this year, $8.7 billion in 1986, and $5.3 billion in 1987.

"These dropping numbers reflect a declining construction program, coupled with an increasing level of internally-generated funds," McCollam said.

About 35 percent of the total funds needed is expected to be from common equity, including contributions from utility dividend reinvestment plans.

Last year, of the total of $13.9 billion in new money, 62 percent was in long-term debt, 6 percent was in preferred stock, and 32 percent was in common stock. Included in the common stock was $3.5 billion from dividend reinvestment and employee stock ownership plans.

Big Rivers co-op . . . from page 1

standing the filing of this action."

Big Rivers is a generation and transmission co-op, selling wholesale electricity to four member distribution cooperatives in the region. Through these utilities Big Rivers supplies about 71,000 customers with electricity.

In its answer to the Justice Department lawsuit, Big Rivers says that in the late 1970s, in cooperation with REA and in response to load studies, it was granted an REA guarantee to the Federal Financing Bank (FFB) for a $1.1 billion loan to finance the construction of the two-unit Wilson station and associated pollution control and transmission equipment.

However, a revised forecast in 1981 showed a marked decrease in demand. Accordingly, Wilson-2 was deferred.

Big Rivers says it kept the REA informed of all these developments.

Adding to the diminishing load problem, the area's National-Southwire Aluminum Co. in May, 1984 told Big Rivers it would oppose any Wilson-1 unit costs in rates. This was a substantial blow to Big Rivers since the aluminum company's Hancock County smelter reportedly accounts for about 40 percent of the utility's generation.

In light of these developments, Big Rivers says it immediately appealed to REA for relief, redoubling its efforts to sell power from or interests in the Wilson Station.

As part of its petition to REA, Big Rivers says it submitted many financial restructuring proposals to the agency, but all of them were rejected.

On November 16, 1984, Big Rivers (which is subject to Kentucky Public Service Commission jurisdiction) filed for a rate increase of up to 7.8 percent. The petition excluded all Wilson-1 costs. Proceedings are currently in progress.

On November 19, REA cut off all loan funding to Big Rivers, subject, the utility says, to its decision to merge with the East Kentucky Cooperative. The utility said it protested this action, declaring it desperately needed the earlier-committed loan funds to pay contractors.

In an attempt to regain the initiative, Big Rivers on November 28 sued REA Administrator Harold Hunter. The utility sought an order requiring REA to approve FFB drawdowns for the Wilson station. In December, the utility commissioned Bechtel Energy Corporation to conduct a study to determine the feasibility of the East Kentucky merge idea. A final report is expected by mid-June.

"This suit," the co-op argues, ". . . [is] for the actual purpose of forcing Big Rivers to agree without qualification to merge with East Kentucky prior to completion of the Bechtel report, and without regard to what that report shows.

"Since November 19, 1984, the REA Administrator has wrongly refused to certify any drawdowns by Big Rivers of loans from FFB for the completion of Wilson Unit 1," the utility's answer document reads. Big Rivers concedes that beginning on November 23 it failed to make payments on notes it owed totalling more than $27 million, in principal and interest.

But, contends the utility in its answer, "Big River's failure to pay such installments is due entirely to the wrongful refusal of the plaintiff to comply with its loan commitment . . . . The plaintiff cannot rely upon the wrongful act of its agent to place Big Rivers in default on its loan."

Finally, the co-op contends that part of its financial problems can be traced to a "fundamental change" in federal energy policy. This is said to have resulted in the abandonment of four synthetic fuels plants planned for construction and operation in Big Rivers' service territory in the late 1970s and early 1980s, an unanticipated depression in the economy, an unanticipated drop in aluminum prices, and "other factors over which Big Rivers had no control."

Uncertainties erode 'business as usual,' report finds

BARRINGTON, IL—Anyone familiar with the electric utility industry knows that major institutional and attitudinal changes are in the works, and the Congressional Research Service of the Library of Congress, in a new report, has documented the dynamic forces underlying them all.

"The one outstanding problem is the uncertainty that surrounds the electric utility industry," the report states. In language that is every day becoming more familiar, it then adds, "Building [new capacity] to meet the estimated peak under uncertain conditions is the surest way to 'go broke'" (see *EL&P*, January 1985, page 3).

The report, *Gold at the End of the Rainbow?: A Perspective on the Future of the Electric Utility Industry*, is a broad, sweeping, yet tutorial look at the major elements of the industry. These include costs and prices of electricity, the financial situation, and demand and capacity issues. The report is also a call to electric utility executives to make their organizations lean and resilient to change.

Declaring that utility planning should be shifted from traditional "point" forecasting to a series of contingency forecasts, the report notes, "This then means that rather than building to meet an anticipated peak, a utility needs to develop a flexible system able to quickly respond to changing conditions."

Demand, capacity estimates vary

In the light of numerous demand uncertainties that could affect the price of electricity, the CRS calculates that future demand could range from 3,228 billion kilowatt-hours by 1995 to 3,762 billion kilowatt-hours, with growth rates from 2.8 percent to 4.1 percent per year.

"This uncertainty carries over into forecasts of peak load," the report states, and "is accentuated by the difficulty that normally surrounds prediction of the weather and of the relationship between peak and average demand (load factor)."

Drawing on electric supply and demand data released by the North American Electric Reliability Council, the CRS report calculates that for the "low" or "probable" demand cases (see table), no construction beyond what is planned for 1993 is needed. For the "high" demand case, however, about twice as much incremental capacity would be needed as is currently envisioned.

"Thus, in attempting to build to meet an uncertain future peak, the utilities are faced with construction of new plant over the next 12 years that could be as little as 120,000 MW (most of which is already being built), or as much as 230,000 MW," the report reads. The estimated cost of these construction programs ranges between $250 billion [and] $500 billion by 1995.

Although CRS researchers believe that, technically, conservation and load management could be of substantial help in meeting future demand requirements, implementation of these methods as alternatives to generation will not even approach the needed theoretical capability.

Referencing their August 1983 report, *A Perspective on Electric Utility Capacity Planning*, CRS researchers calculate that the effect of conservation from more efficient buildings, equipment, and appliances could produce cost-effective savings of as much as 161,000 MW by 1990 and 214,000 MW by the year 2000. Load management is estimated to save 104,000 MW in 1990 and 124,000 MW by 2000.

"In considering the above contributions," the report declares, "it appears that institutional inertia may prevent full realization of the cost-effective conservation and load management potential. That is, there is a reluctance on the part of people and institutions to make changes or to scrap existing equipment, even if such changes appear to be economically beneficial."

Flexibility the key

According to CRS researchers, achieving a flexible, minimal-risk utility system requires innovation and includes building smaller plants; rehabilitating older ones; beefing up inter-system and inter-regional interties, and moving to create an interregional bulk power market. It also requires developing rate structures to control demand and that permit flexiblity in meeting reliability requirements.

Only smaller generating plants have the advantage of minimizing risk by reducing the utility's financial exposure, CRS researchers say. Confronti..g the widely-promoted idea that building smaller plants excludes economies of scale inherent in large plants, they note that a review of data for coal-fired plants coming on line between 1978 and 1982 indicates that only plants larger than 1,000 MW show true economies of scale (i.e.,are less expensive).

"Plants below this level do not appear to follow any cost pattern," the researchers note.

In November 1983, CRS conducted a study comparing the economics of building large and small nuclear plants. The report assumed that plants of 400 MW would be 12 percent more expensive than a single 1,200 MW plant; however, bringing these smaller plants on-line sequentially would be less expensive overall. This was because financing difficulties associated with the larger plant would overwhelm the economies of scale the larger plant offered.

"One can conclude that in many circumstances it may be advantageous to forego the economies of scale and build small in order to minimize risk," the CRS researchers conclude in the current report.

Unfortunately for those who might be inclined to respond to these conclusions, a small nuclear plant design has yet to be licensed in the U.S.

On extending plant lifetimes, the CRS team notes that savings can accrue from the fact that the plant already exists, is probably fully depreciated and may not need a new operating permit. Of equal importance is the potential for an increase in plant reliability, lower heat rates, and lower operating and maintenance costs.

"It is apparent that life extension is a procedure that is here," the CRS report states, "and while not necessarily cost effective or possible for every aging plant, it does have the potential to substantially reduce costs."

The CRS report briefly describes some preliminary experiments in the spot-market pricing of electricity and the deregulated sale and purchase of bulk power between certain specified utilities. If these experiments prove successful, and are allowed to proliferate throughout the industry, "the introduction of competition could well change the face of the industry, with attendant changes in the regulatory system," the CRS report suggests. "By the same token, it could result in a more efficient industry, better able to adapt to the realities of the market place over a shorter time period than at present."

SUPPLY AND DEMAND SCENARIOS, 1995

Item	Demand Case: Low[1]	Probable[2]	Medium[3]	High[4]
Required Capacity 1995 (million kW)[5]	691.2	718.4	775.2	831.8
Available Supply (million kW)				
Capacity, 1993	698.8	698.8	698.8	698.8
Net Imports[6]	22.8	22.8	22.8	22.8
Total	721.6	721.6	721.6	721.6
Additional Capacity Needed (million kW)	-30.4	-3.2	53.6	110.0
Capital Required ($billion $)[7]				
1993 Capacity	173	173	173	173
Additional Capacity	–	–	64	132
Transmission and Distribution	91	91	132	174
Total	264	264	369	479

[1] 2.7% annual GNP growth, 3.4% annual increase in electric prices, 64% LF.
[2] 3% annual GNP growth, 3.8% annual increase in electric prices, 64% LF.
[3] 3.8% annual GNP growth, 1% annual increase in electric prices, 62% LF.
[4] 4% annual GNP growth, 1.2% annual electric price increase, 62% LF.
[5] Assumes 20% reserve margin.
[6] Converted to equivalent capacity at average capacity factor for Canadian hydro (60.9%).
[7] New coal plants at $1200 per kW, coal conversions at $800, nuclear at $2200, hydro at $1000, other at $500/kW, and transmission and distribution at $750.

Source: CRS and NERC.

Time-of-use rates: benefits murky

Although CRS researchers generally endorse innovation in ratemaking, noting that it can have a substantial effect on operations, they nevertheless conclude that for all their publicity, time-of-use (TOU) rates cannot be shown to accomplish much.

"If rates are to be based on cost, they should follow a time-of-day and seasonal pattern," the report advises. But the CRS researchers are quick to point out that for high load factor utilities, on-peak and off-peak generation costs may be so similar as to make the costs of TOU implementation too high.

"Despite the strong conceptual base for this form of pricing, there are problems, including a need for a timed meter to determine the relationship of the customers' peak to the system peak," the CRS report says.

Given current technology, the installation of such meters is expensive and could impose a substantial financial burden on utilities.

"Whether or not the cost of new and more complex meters would equal the cost of new capacity *not* required is open to argument," the researchers conclude. "The costs and benefits of peak hour pricing are somewhat murky."

Four electric utilities will vie for Edison Medal

WASHINGTON, DC—Four investor-owned utilities will compete for the Edison Electric Institute's highest honor—the Edison Medal. The award will be presented to the winner at the institute's annual convention in Denver on June 12.

The four nominated companies are Baltimore Gas & Electric Company, Duke Power Company, Georgia Power Company and Puget Sound Power & Light Company.

The companies were selected by a committee headed by *EL&P* Editor Robert A. Lincicome, based on information and recommendations provided by top utility executives in all regions of the country. Others on the selection committee were William Hayes, editor of *Electrical World*, and Lucien Smartt, editor of *Public Utilities Fortnightly*.

The nominees have been invited by EEI Chairman Paul D. Ziemer, president of Wisconsin Public Service Corporation, to prepare documentary presentations that will be used by the panel of judges in final selection of a winner.

Baltimore Gas & Electric was selected as a finalist for development of a wide array of programs emphasizing the utility's close identity with the community and demonstrating unusual awareness of human needs and leadership in the pursuit of civic betterment. For example, the company was instrumental in creating the first fund in the nation for assisting needy householders with winter fuel bills. It has been involved in close cooperation with governmental bodies, labor unions and charitable organizations for the relief of suffering, and in educational programs aimed at raising the level of public awareness of feasible conservation measures and accessible sources of assistance in attaining more efficient use of energy. In all, the company's own programs and participating efforts with other organizations has exemplified utility industry effectiveness in dealing with community concerns.

Duke Power Company was nominated for management excellence and courage in constructing and operating its latest nuclear units at levels of construction cost and operating efficiency that conclusively demonstrate that nuclear power remains a safe and economic source of energy, and for its bold program of active political participation as a concerned corporate citizen.

Georgia Power Company's nomination was based on its courage and vision in demonstrating in its day-to-day system operations the very essence of the utility industry's basic philosophy of service by offering customers a computer-based, loadoption program that displays the cost of service in real-time, thereby permitting the customer to select a personal level of demand based on his or her own cost/benefit analysis.

Puget Sound Power & Light Company was nominated for adding new meaning to the term "Corporate Citizenship" through creation and implementation of successful programs to assist needy, elderly low-income customers. These programs reach far beyond those normally offered by electric utilities and include the formation of partnerships of corporations

Continued on page 7

Rescue nuclear, bolster industry, EEI urges

Group calls for broad reforms to revive nuclear option

Dan Utroska
Associate Editor

WASHINGTON, D.C.—The Edison Electric Institute has put forth a broad strategic outline aimed at reviving the nuclear power plant option in America and rescuing the electric utility industry from potentially dangerous undercapacity.

In a new report, EEI says unanticipated difficulties experienced by investor-owned utilities with power plant financing; with federal, state, and local governments; and with the public acceptance of nuclear power, have practically eliminated the nuclear option in America.

EEI suggests that these problems have seriously eroded the unquestioned authority historically wielded by utility executives in assessing electricity demand and in unilaterally deciding the type, size, and timing of power plants.

Cooperative planning and decision-making is urgently needed, therefore, if the country is not to experience electricity shortfalls.

"What the nation needs now is not more controversy, but a step toward consensus and the development of conclusions that can guide the actions of the federal and state governments and of the [electric utility] industry," reads a newly-issued EEI report.

To this end, the institute calls for the early establishment of a National Commission on Electricity. Composed of a "small and expert group of distinguished Americans," EEI sees the commission taking over the role traditionally occupied by electric utility executives. "It should make judgments on the future growth of electricity demand and the means by which any need can be met by both reductions in demand and increases in supply."

EEI notes that if the commission finds that additional generating capacity will be needed in the future, it should define the circumstances where it "would again become economically rational" for utilities to make major capital investments in new plant. Further, EEI would like the commission to articulate the generating options that it determines are feasible.

Finally, the commission "would recommend policies which flow from its judgments on those issues."

In addition to the formation of such a national commission, EEI also calls for the industry to make greater use of separate nuclear companies and joint ventures to spread nuclear construction risks.

"Even with standardized designs allowing for shortened lead times and lower construction costs, individual utilities may be reluctant to embark on new nuclear construction by themselves."

And in the future, manufacturers and service companies will have to bear more risk than in the past. Future contracts for nuclear construction will have to incorporate "reasonable" cost-increase risks among utilities, suppliers, and architect-engineers, EEI says.

In addition to these recommendations, EEI has proposed a broad agenda of reform, including the licensing of standardized nuclear reactors, the maintenance of safe nuclear operations, and efforts to educate the public about nuclear power.

Nuclear vs industry problems

The Report of the Edison Electric Institute on Nuclear Power goes further than officially suggesting for the first time the end of nuclear power growth in America. It also constitutes the platform from which the national association of investor-owned electric companies voices its concern that the disincentives for new plant construction are virtually universal throughout the industry, existing as much for that portion of the electric utility industry that is financially healthy, as that segment in financial trouble, due primarily to construction difficulties with nuclear power plants.

"Electric utilities are no longer willing or able to embark on major construction projects that threaten them with financial ruin," the EEI report states. "The recent improvement in the financial health of a large part of the electric utility industry should not be confused with a resolution to this problem. The financial improvements are strongly correlated with the completion or winding down of current construction programs. The fact that utilities may be able to gain in financial health when they stop building does not mean that they could remain in financial health with major new construction commitments."

Today, though, those companies currently facing the largest threat of financial ruin are those utilities now constructing nuclear power plants. These financing difficulties, combined with what EEI sees as a host of regulatory, managerial, and public perception problems, has led the institute to formally declare, "A new nuclear unit is now an option no American utility will choose—even when demand growth clearly requires new generating capacity."

Concluding that new post-Three Mile Island regulations have had a large impact on the costs of constructing new nuclear plants, EEI acknowledges what has become increasingly obvious over the past few months—namely, that nuclear plants no longer compete economically with coal-fired power plants.

"The increased costs of the [nuclear] units being completed in the mid-1980s means that most of them will not generate electricity as cheaply as most new coal units equipped with flue gas scrubbers," the EEI report concedes.

But for EEI, such disheartening economics do not necessarily dictate nuclear cancellations. "Even when the nuclear unit is not needed immediately and the more distant costs of completing an alternative generating unit are discounted to allow for the time value of money, the cost of the alternatives will usually be greater than the incremental cost of finishing a substantially completed nuclear unit."

But if current public policy should prohibit the completion of these units, the final death knell for nuclear power in the United States may be struck, EEI says in its report.

According to the institute, the problem with nuclear costs is not only that they have risen precipitously, but that they have risen "unpredictably." This is what has led to industry calls for consensus planning.

In a statement that reveals the present invalidity of nuclear power plant cost estimates, EEI declares, "Under present circumstances, a utility cannot determine the cost of building a unit that complies with all requirements existing at the time and then expect to build that unit."

As devastating to nuclear power as the onerous regulations and unpredictable cost increases of the past, is the growing disinclination of the public—often expressed through local governmental bodies—to approve the operation of nuclear plants. Bringing to mind the current controversy over the Shoreham nuclear plant, where Suffolk County is effectively prohibiting the licensing of the plant by refusing to approve an emergency evacuation plan, EEI states, "While the theoretical possibility that an operating license could be denied to a completed plant has never finally materialized, the risk cannot be ignored."

Referencing the January 1984 rejection by the Nuclear Regulatory Commission's Atomic Safety and Licensing Board of Commonwealth Edison's Byron-1 nuclear license application, EEI concludes that such an action "has made clear that the risk is real."

Byron-1 has subsequently been

Continued on page 18

PLANTS WITH CONSTRUCTION PERMITS AND A UTILITY-SCHEDULED COMPLETION DATE (AS OF 31 JANUARY 31, 1985)[1]

Plant	Utility	MWe	Utility estimate of completed construction	Percent completed (December 31, 1984)[2]	Percent completed (December 31, 1980)[2]
1. Diablo Canyon 2	Pacific Gas & Electric Co.	1106	1985	99.0	89
2. Comanche Peak 2	Texas Utilities	1150	1985	100.0	76
3. Watts Bar 1	Tennessee Valley Authority	1170	1985	99.0	83
4. Palo Verde 2	Arizona Public Service Co.	1238	1986	99.6	50.1
5. Perry 1	Cleveland Electric Illum. Co.	1205	1985	97.0	62.9
6. River Bend 1	Gulf States Utilities Co.	940	1985	93.0	23
7. Watts Bar 1	Tennessee Valley Authority	1170	1985	99.0	83
8. Wolf Creek 1	Kansas Gas & Electric Co.	1150	1985	98.4	78
9. Beaver Valley 2	Duquesne Light Co.	923	1986	83.3	41
10. Braidwood 1	Commonwealth Edison Co.	1175	1986	80.0	59
11. Byron 2	Commonwealth Edison Co.	1175	1986	67.0	58
12. Catawba 2	Duke Power Co.	1145	1986	84.1	18
13. Clinton 1	Illinois Power Co.	950	1986	88.7	75
14. Comanche Peak 1	Texas Utilities	1150	1986	99.0	86
15. Hope Creek 1	Public Service Elec. & Gas	1067	1986	94.5	25
16. Nine Mile Point 2	Niagara Mohawk Power Corp.	1100	1986	85.0	38
17. Seabrook 1	Pub. Ser. Co. of New Hampshire	1200	1986	80.0	43.3
18. Shearon Harris 1	Carolina Power & Light Co.	900	1986	90.0	37
19. South Texas 1	Houston Lighting & Power Co.	1250	1986	72.0	58.9
20. Vogtle 1	Georgia Power Co.	1215	1986	73.0	17.6
21. Watts Bar 2	Tennessee Valley Authority	1170	1986	68.0	70
22. Braidwood 2	Commonwealth Edison Co.	1175	1987	54.0	46
23. Comanche Peak 2	Texas Utilities	1150	1987	38.0	30
24. Byron 1	Commonwealth Edison Co.	1175	1987	54.0	46
25. Callaway 2	Union Electric Co.	1150	1987	38.0	30
26. Perry 2	Cleveland Electric Illum. Co.	1205	1988	44.0	39.5
27. South Texas 2	Houston Lighting & Power Co.	1250	1988	43.0	21.9
28. Vogtle 2	Georgia Power Co.	1215	1988	50.0	4.4
29. Callaway 1	Union Electric Co.	1150	1988	38.0	30
30. Grand Gulf 2	Middle South Energy	1250	1990	33.0	22.4
31. Limerick 2	Philadelphia Electric Co.	1065	1990	31.0	18

[1] Source: Edison Electric Institute. [2] Source: *Nuclear News*, World List of Nuclear Power Plants.

Point/Counterpoint . . . from page 18

awarded its operating license.

"Until public attitudes become more understanding, it will be difficult for utilities to again consider nuclear units," EEI says in its report.

Finally, EEI admits that its member companies have been part of the problem. "In any assessment of the history of nuclear power, it would be wrong to suggest that the utilities or the architect-engineers and nuclear suppliers have been blameless or that all of the problems of nuclear power arise from deficiencies of law and regulation and the activities of nuclear opponents. Such is not the case. Like any companies launching a complex new technology, the developers of nuclear power have made errors and misjudgments. In some cases they failed to appreciate the complexity of nuclear power and to respond adequately to the demands it poses."

But the institute is not inclined to drop the entire responsibility at the feet of the investor-owned utilities. "But those deficiencies are not adequate to explain why the entire industry has turned away from nuclear power or why even companies confident in their own abilities in construction and nuclear operations will shun nuclear orders."

Acknowledging that predicting future electricity demand is as risky a business as building new nuclear plants, EEI notes that with a peak demand growth of 2.5 percent per year and a capacity margin of 20 percent, additional capacity will be needed by 1992 beyond what is currently being constructed. Somewhere around 1992, the 2.5 percent annual peak demand curve crosses over the installed capacity curve, the latter reflecting plant retirements reported to the North American Reliability Council.

Using what it terms moderate growth rates of GNP and electricity demand, combined with "very modest assumptions" on plant cancellations and retirements, and allowing for achievable incremental reductions in demand, EEI calculates that 100 to 200 GW (gigawatts, or million kilowatts) of new generating capacity will be needed by the year 2000. This capacity, EEI says, is in addition to the units under construction today.

"With the disincentives to building that now face the electric utility industry, that [100 to 200 GW] is a daunting prospect for the industry and a challenge for the nation," the EEI report states. "The danger in the present situation is that decisions not to build that are in the best interest of the individual utilities will not add up to a result consistent with the national interest in adequate generating capacity."

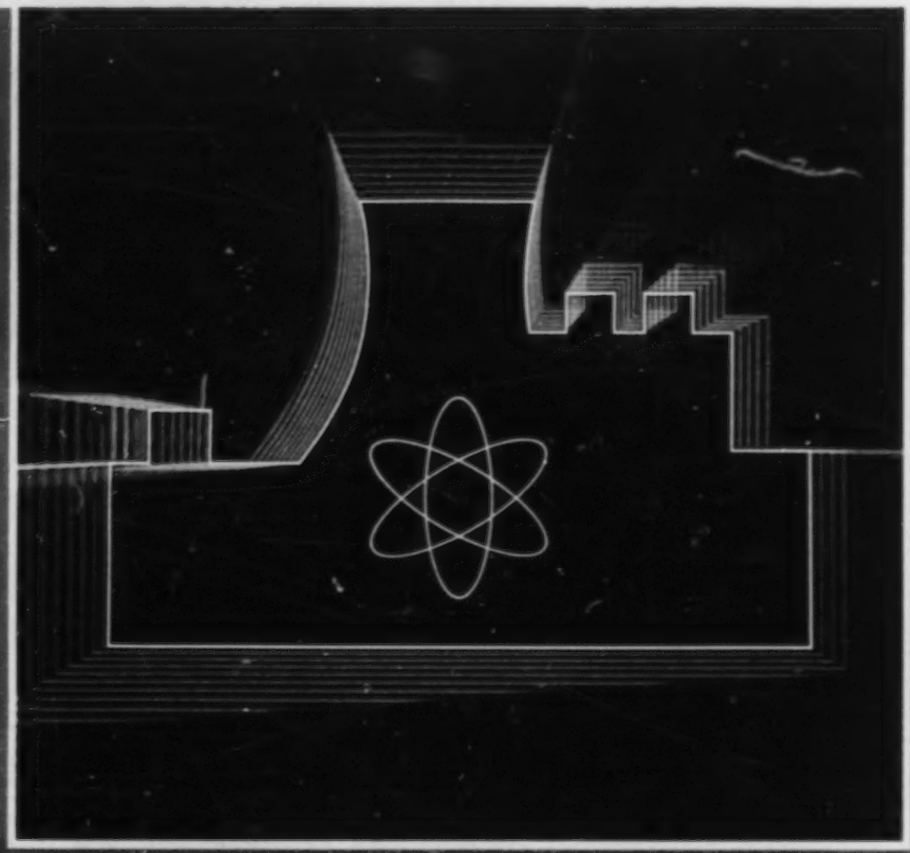
Examination of the accompanying table shows that 31 nuclear plants are currently in the construction pipeline. Unless there are new orders soon, the last six plants will come out sometime between 1988 and 1990, and will mark the end of nuclear power plant additions in the U.S.

Of interest is the fact that all six of these plants due on line between 1988 and 1990, as well as the Braidwood-2 plant which is expected to become operational in 1987, are all less than 55 percent complete at the present time.

The cancellation of any of the nuclear plants now in construction will have to be made up if adequate power levels are to be maintained, EEI suggests.

Further, the institute notes that the attention devoted to nuclear power tends to focus on the troubled nuclear plants now under construction while little regard is given to the role that nuclear power could play in America's energy future.

Again linking perceived industry problems with those of nuclear power, EEI concludes, "In our judgment, the United States is on a course that is full of peril. Our country has drifted into a *de facto* electricity policy that it would not deliberately choose. But if we can soon adopt policies shaped by a long-term view of our electricity situation, it is not too late to avert serious damage to our economy."



SARGENT & LUNDY IS...

HELPING TODAY'S NUCLEAR STATIONS KEEP PACE WITH ADVANCING TECHNOLOGY

As the rate of technical innovations quickens and regulatory changes continue, more utilities are relying on Sargent & Lundy to help improve the safety and performance of their nuclear stations.

Sargent & Lundy specialists have extensive experience in applying a wide range of new technologies to nuclear plant modifications.

We can show you how advanced hardware can reduce your radwaste processing costs. Or how Sargent & Lundy's computer software can help monitor spare parts inventories and make your maintenance programs more efficient.

Our Instrumentation and Control Upgrade Program provides cost-effective and licensable implementation of post-TMI, ATWS, and state-of-the-art upgrades—from input/output hardware replacements to a complete process computer.

Modifications in response to new NRC requirements are areas of special Sargent & Lundy expertise. We have been continually upgrading nine nuclear units while under construction and have made similar modifications to 18 more operating units.

Find out how Sargent & Lundy can help your plant keep pace with advancing technology. For information on the complete range of Sargent & Lundy's nuclear services please write or call Art Brearley at 312/269-3802.

SARGENT & LUNDY ENGINEERS

55 EAST MONROE STREET CHICAGO, IL 60603

New fiber optics communications system supplier

PITTSBURGH—A joint venture has been formed by Alcoa Conductor Products (ACPC) and Fujikura Ltd. of Japan to develop and market advanced power transmission and fiber optics telecommunications technology. To be known as Alcoa Fujikura Ltd., the new supplier will be headquartered in Spartanburg, SC.

Relocate business

ACPC also will relocate its electrical transmission accessories business from Massena, NY to the Spartanburg plant. Fujiukura will be a minority partner in this new subsidiary—Alcoa Conductor Accessories, Inc.

Fiber optic communications offer utilities substantial improvements in efficient data acquisition, supervisory control and load management savings and can be retrofitted to existing systems through use of established rights-of-way.

Total investment in the two new companies is reported to be $15-20 million. The Spartanburg plant will be fully operational be the end of the year.

Goal satisfied

The new venture is said to satisfy Alcoa's goal of advancing into new, high-tech and high-growth fields and Fujikura's desire to expand in international markets.

Volume 63, Number 6
June 1985

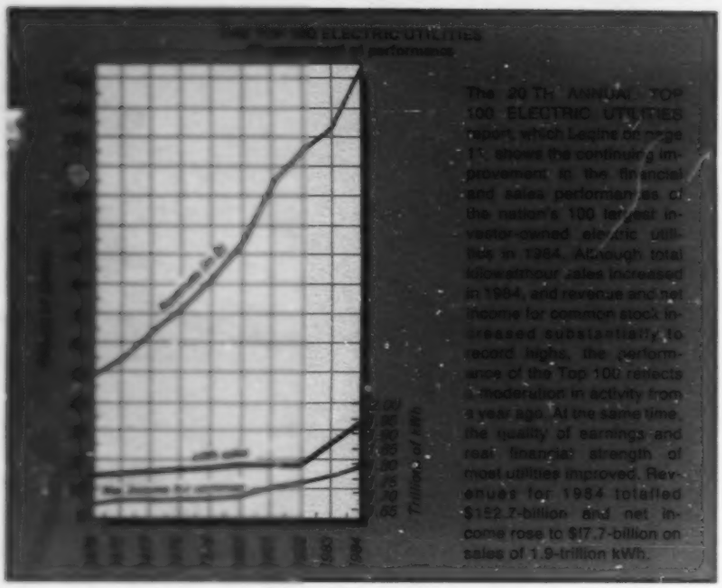
C850-7

09625 1957257 b 4 1965
JOSEPH MCNALLY
CONGRESSIONAL INFO SERVIC D
4520 EAST WEST HWY
BETHESDA MD 20814

Electric Light & Power

THE NEWS MAGAZINE OF ELECTRIC UTILITY MANAGEMENT AND TECHNOLOGY

©TECHNICAL PUBLISHING



The 20TH ANNUAL TOP 100 ELECTRIC UTILITIES report, which begins on page 11, shows the continuing improvement in the financial and sales performances of the nation's 100 largest investor-owned electric utilities in 1984. Although total kilowatthour sales increased in 1984, and revenue and net income for common stock increased substantially to record highs, the performance of the Top 100 reflects a moderation in activity from a year ago. At the same time, the quality of earnings and real financial strength of most utilities improved. Revenues for 1984 totalled $152.7-billion and net income rose to $17.7-billion on sales of 1.9-trillion kWh.

Seabrook financing OK'd; completion still in doubt

Fitchburg withholds May construction payment

CONCORD, NH—The New Hampshire Public Utilities Commission has conditionally approved a $525 million financing strategy submitted by Public Service Company of New Hampshire for its Seabrook nuclear plant, but circumstances existing at the time of the PUC order, as well as subsequent developments, raise serious questions over whether the plant will ever be completed.

Bankruptcy averted

Concluding that it would drive PSNH into bankruptcy if it did not act, the commission stated in its April order that "the public interest would be better served by completing Seabrook than by abandoning the project."

"Substantial evidence affirms our conclusion that a denial of the proposed financing and cancellation of Seabrook unit one without recovery of the investment of $1.28 billion will compel a Chapter 11 reorganization," the order further stated.

A key determinant in the PUC's finding appears to be its reading of New Hampshire state law that prevents recovery of sunk investments in cancelled plant.

Seabrook estimate: $4.65 billion

The combined owners of Seabrook now have $3.2 billion invested in the plant. PSNH currently estimates that unit 1 will cost about $4.65 billion when completed, a figure that includes allowance for funds used during construction. The company projects commercial operation in the last quarter of 1986. This projection was based on full-spending authorization by April 1, 1985.

Although such authorization was not achieved by April 1, a New Hampshire Yankee spokesman said there has been no revision in the total estimated cost of the project. Currently, construction is being conducted at a rate of $8 million per week, even though the joint owners are funding the project at only $5 million per week, or at about two-thirds of the optimum rate. According to NHY's John Kyte, the difference is being made up from earlier construction that came in under budget.

Continued on page 9

Industry disunity over accounting goals threatens utility financial interests

Dan Utroska
Associate Editor

CHICAGO—The electric utility industry's inability to speak with a clear, unified voice on pending revisions to industry accounting practices appears to be weakening the effectiveness of individual utility accounting proposals submitted to the nation's accounting standards board.

"It would be helpful to the [Financial Accounting Standards] Board if the various facets of the industry could get their act together and agree among themselves as to what the ramifications of these new phenomena should be," FASB member Arthur R. Wyatt told a special meeting of securities professionals here.

The "new phenomena" referred to by Wyatt are the often-huge dollar amounts associated with state regulatory decisions refusing full or partial cost recovery for plant investments. These disallowances have caused the Securities and Exchange Commission, the Congress, and the financial press increasingly to declare publicly that many of the conventional methods for reporting utility financial transactions are obsolete. As a result, the FASB now finds itself under mounting pressure to revise utility accounting guidelines and to do it quickly.

An "exposure draft" of the board's revised procedures is expected to be released for comment in early July, with final rules to be in place in time for the 1986 reporting year.

As one indication of the disagreement that exists among utility executives over financial accounting methods, Wyatt reported to luncheon attendees of the Utility and Telecommunications Securities Club of Chicago that views differ widely on when and how a utility should recognize a cost disallowance.

In a public hearing held to receive industry views, one chief financial officer of a West Coast utility reportedly argued that he would write down disallowed costs rather than carry them forward as an asset. His reasoning, Wyatt said, was that because this executive's bankers interpreted the disallowance as a loss, the CFO should do likewise.

"I must say it is a fairly persuasive line of reasoning," Wyatt offered.

Most utility executives, however, put forward the counter-argument, he said; namely, that the loss should not be written off, but carried forward in the expectation that recovery through future revenues will be permitted. This argument relies on the long history of regulatory decision making in the U.S. that demonstrates that utility investments will, in one form or another, be recoverable from ratepayers. Notwithstanding certain changes in the regulatory process, nothing has happened that is so revolutionary as to suggest that this process has broken down, the argument continues. And if there has not been a regulatory revolution, there is no need for revolutionary accounting procedures.

Reporting changes contemplated

No one is sure just what the FASB

Continued on page 3

Another task-force review of nuclear power promised

DOE's second annual nuclear revival speech given May 8

Dan Utroska
Associate Editor

WASHINGTON, D.C.—Amid both praises and criticisms of the nuclear industry, Department of Energy Secretary John S. Herrington announced on May 8 that the federal government will conduct a comprehensive examination of nuclear power in America.

"I have discussed this issue with the President, and he has decided to have a Cabinet-level review of the status of this important power source," the DOE chief told the Nuclear Power Assembly here. "We are prepared to look at the full range of issues."

It was exactly one year ago to the day when Herrington's predecessor Donald Hodel stood before the same assembly and declared, ". . .The Deparment of Energy is taking steps to see to it that safe and economically feasible nuclear plants under construction can be completed as part of our strategy for a balanced and mixed energy supply.

"Perhaps that time has come," Hodel continued, "when we should consider removing the disincentive in ratemaking experienced by those who have the foresight to opt for the lower, long-term costs of nuclear power.

Secretary of Energy John Herrington

Hodel added, "Because the federal government has been part of the problem for many troubled plants, we must also provide part of the solution."

In this year's nuclear revival address, Herrington confronted the often-heard assertion that the govern-

Contnued on page 20

Foreign Power Briefs

● **The mayor of Stockholm** and the chairman of the Stockholm Energy Company have announced that a 131,000-kW, coal-fired plant using two pressurized fluidized bed combustion units will be installed in Stockholm. The ASEA project will involve replacing an oil-fired unit in a cogeneration plant. It also will provide 215,000-kW of steam heating for downtown Stockholm. American Electric Power said it recently submitted an information proposal to the U.S. Department of Energy requesting federal cost-sharing for a similar project at Ohio Power Company's Tidd Plant on the Ohio River.

● **Coal buyers from nineteen European countries** met with officials of the U.S. coal industry in Holland in April to discuss how trans-Atlantic coal trade might be increased. According to the National Coal Association, overseas coal trade last year totalled 60.65 million tons with a value of $3.053 billion. In 1983 the comparable figures were 60.06 million tons and $3.121 billion. NCA said the outlook for U.S. coal exports in 1985 is "uninspiring," with the overseas component expected to be slightly smaller than last year's level. Impeding short-term growth are several factors, said the association, including the strength of the dollar, limited international credit, high consumer stock levels and aggressive competition from other coal suppliers.

● **Quebec's government** announced it plans to sell preferred stock to the public in Hydro-Quebec, the provincially-owned electric utility. The measure was contained in the provincial budget. According to *The Wall Street Journal*., Finance Minister Yves Duhaime said that the usefulnees of some state-owned companies had declined in recent years. Duhaime said legislation will be introduced in Quebec's national assembly to permit the sale of preferred shares of the utility. He said the government would maintain control of Hydro-Quebec.

● **Nuclear plant capacity** planned outside the U.S. is on the rise, according to the Atomic Industrial Forum's annual international survey. The AIF survey found that 562 commercial reactors were operable, under construction, or planned in 40 countries outside the U.S. at the end of 1984, compared with 541 units in the previous year's survey. Nine new plants were ordered in 1984, while 18 new reactors began operating outside the U.S. last year. AIF said the number of reactors in the planning stage grew from 157 in 1983 to 172 in 1984.

● **The International Atomic Energy Agency** (IAEA) reports that nuclear energy has accounted for 3,500 reactor/years of safe operation around the world since the first reactor began operating in 1954. During that time, IAEA said there has not been a single accident causing "significant harmful effects on the public." Nuclear power now produces about 13 percent of the world's electricity.

● **The People's Republic of China** (PRC) and the United States have agreed to include coal and other fossil energy topics in future scientific and technological exchanges. The agreement was announced in late April at the US-PRC Joint Commission on Cooperation in Science and Technology meeting. The Department of Energy said the two countries can exchange scientists and technical information as well as fuel samples, materials, instruments and components for joint research efforts. The agreement also establishes a mechanism for organizing joint seminars, conferences and other meetings dealing with fossil energy. DOE said the pact will remain in effect for five years and may be extended by mutual agreement.

In This Issue

Editorial 4

The Top 100 Electric Utilities...*EL&P*'s 20th annual report on the financial and sales performances of the nation's 100 largest electric utility companies. 11

Calendar 23

Infrared detection has proven to be a valuable preventive maintenance tool for substations at Missouri Public Service Company. T/D 25

Batteries for large-scale utility load leveling are getting a fresh look. G . 32

Exotic Energy is at a crossroads with possible loss of subsidies, increased competition from abroad. G 38

Readers' Service 49

Bulletin Board 51

New Products 60

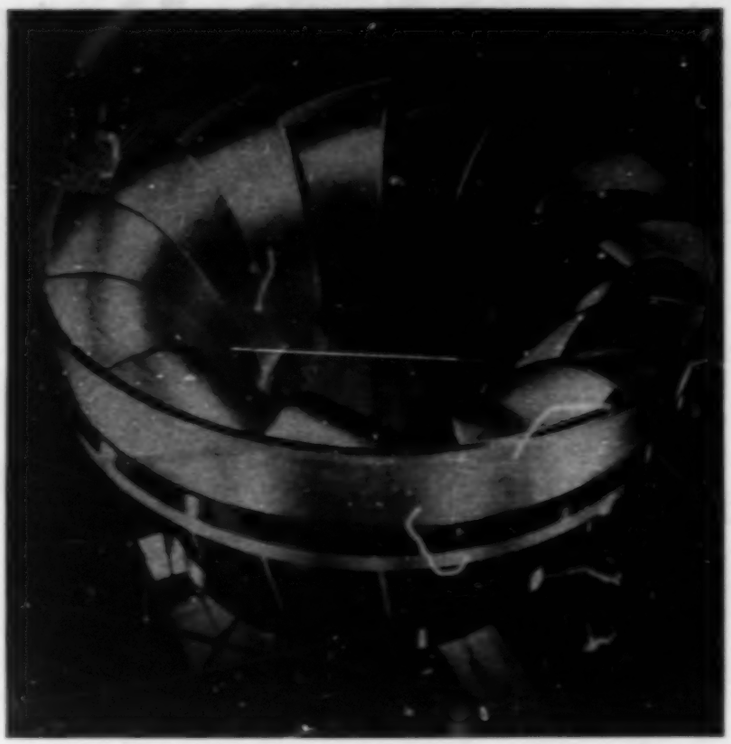
Regulatory Review 64

Personnel 66

Management Methods 68

EL&P readers whose responsibilities include both Generation and Transmission/Distribution receive both technology sections. Other readers receive the technology section that applies to their respective area of responsibility. The Generation edition is indicated by a single dot (•) in the upper right corner of page 1; the T/D edition carries two dots (••). All readers receive EL&P's industry news section.

Aswan Dam, 180-MW hydro runners shipped as units



One of 12 giant hydro turbines shipped as single units for Aswan High Dam rehab project.

YORK, PA—Allis Chalmers reports that the hydro turbine runners it's building for Egypt's Aswan High Dam are the largest it's ever built and shipped as single units.

The company is rehabilitating the facility's 12 turbines at the rate of two a year. Each turbine will get a new stainless steel runner, shown in the photo.

The runners with 136 tons each, are 22 feet in diameter, and are 12.4 feet high. They operate on a 220-foot head.

The first one was recently hauled via road to Baltimore for shipment to Egypt.

Allis Chalmers said the runners it built for the Grand Coulee Dam in Washington were bigger, but they were built in segments and assembled in the field.

UPC acquires quality assurance lab

ATLANTA—Utility Power Corp. has acquired Universal Testing Laboratories, a 19-year-old Cedar Grove, NJ, organization primarily engaged in supplying inspection personnel for quality assurance functions and related services primarily to the U.S. nuclear industry.

The laboratory since the fall of 1983 has been performing non-destructive testing at U.S. power plants, mainly nuclear.

PASNY T-line structure tested by Meyer

RED WING, MN—A tangent structure to be used on a new transmission line of the Power Authority of the State of New York has been successfully tested to destruction here by its manufacturer, Meyer Industries. The Poly-12 design that was tested is typical of the structures to be used on the 150-mile line to be built between Marcy, near Utica, to East Fishkill, east of Newburgh.

The 142.7-ft steel pole was subjected to 12 loading conditions, including NESC Heavy Wind (104 mph), 1.5-in. radial ice (under single-circuit loading) and continuation of the High Wind test to destruction. The pole failed during the latter test at 115 percent of maximum design loads.

PASNY says it plans to begin construction of the line later this summer. The agency estimates that the line will save consumers an average of $186-million per year by permitting replacement of oil-fueled electricity.

Full-scale tests have been completed on this 142-ft tangent structure for the Power Authority of the State of New York. The tests were carried out by Meyer Industries, fabricator of the pole. This design will be used on PASNY's line from near Utica to East Fishkill, in southeast New York.

20th Annual Top 100 Electric Utilities Report

Most utilities bettered '83 records last year and improved the quality of their earnings

Robert A. Lincicome
EL&P Editor-in-Chief

The improving financial performance of the nation's 100 largest utilities, which began in 1981, continued through 1984, leading to a healthier, more economically viable industry, stronger overall than for many years.

In 1984, total corporate revenue, net income and kilowatt hour sales were up, posting new records, to the surprise of nobody. Earnings per common share grew for the majority of utilities, although the growth tended to moderate after 1983's rapid rise.

In summary, the nation's largest investor-owned utilities sold 1.93-trillion kilowatthours in 1984, an increase of 6.5 percent. These companies produced revenues of almost $153-billion, up 15.7 percent, and net income of more than $17-billion, a 21.2 percent gain. Earnings improved, but only 3 cents per share, the smallest gain in a decade.

But while earnings growth may have slowed, a number of the Top 100 Electric Utilities were able to improve the *quality* of their earnings by reduction of the portion of income represented by Allowances for Funds Used During Construction (AFUDC). This has been done as large-scale construction projects have been completed and cranked into the rate base.

AFUDC is the calculated return utilities accrue on funds used in construction. It represents the cost of money used in capital expansion projects during the construction period, in effect the interest that money could have earned had it been "invested." Until a project goes into service and the cost can be brought into the rate base, AFUDC adds to Net Income, but contributes no cash. Thus, the presence of AFUDC inflates the utility's financial image.

As the ambitious system expansion programs launched in the mid- to late-70s wind down, especially those involving nuclear and other large, long-term projects, utilities have been able to reduce their cash outlays, both from internally generated and external funds. AFUDC has been reduced substantially by many utilities, which has improved the real quality of those utilities' earnings. In fact, as is reported elsewhere in this issue, about a third of the Top 100 electric utilities are in this condition.

Although references in this report are largely to the Top 100 Electric utilities, only 99 companies' performances are included this year. Portland General Electric Company did not provide information despite repeated requests.

Kilowatthour sales for the 99 companies reporting 1984 data increased 6.5 percent in 1984, slightly below the industry's long-term 7-percent growth rate, but healthy compared with other annual post-embargo performances. For example, kWh sales grew only 2.2 percent in 1983 and in 1982 reflected a small decline. The total for 1984, reported by 99 companies, was 1.93-trillion kWh. In 1983, the total posted by those same 99 electric utility companies was 1.829-trillion kWh.

For most utilities, weather tended to be more normal in 1984 than in the past few years, but usage was up in all customer classes. Residential use increased by 3.5 percent, while commercial or small light and power customer use was up 6.0 percent. Industrial and large light and power customer use was up 7.5 percent, reflecting continuation of the nation's economic recovery.

Only 26 companies reported kilowatthour sales increases in excess of the industry's historic 7-percent growth rate. But this represents an almost 100-percent improvement over a year ago. In addition, 87 utilities posted positive gains in kilowatthour sales, a 13 percent improvement from a year ago.

Median change was +4.88 percent, up from 3.22 percent in 1983 and -1.97 percent in 1982.

Among the 10 largest sellers of electricity there were three changes in ranking. Commonwealth Edison, fourth in 1983, fell to sixth, allowing Pacific Gas & Electric and Southern California Edison each to move up a notch, to fourth and fifth, respectively. The rankings of the Top 10 kWh sellers is shown in Table I.

Average annual residential electrical usage reached an all-time high in 1984, topping the previous record established in 1978. Average annual residential use increased to 8823 kWh in 1984, a gain of 1.9 percent from 1983 and 1.4 percent above the 1978 average of 8705 kWh.

As in the past, the utilities reporting the highest residential usages are

EARNINGS GROWTH STATISTICS

Company Name	Rank	% Change From 1983	1984 Earnings Per Share, $
Louisville Gas & Electric	6	32.06	3.79
Central Louisiana Electric	7	27.02	3.62
Sierra Pacific Resources*	8	24.12	2.11
Pacific Gas & Electric	9	21.86	2.62
Potomac Electric Power	10	21.43	3.23
Empire District Electric	16	17.93	2.96
Idaho Power	17	16.67	5.25
Southern Indiana Gas & Electric	18	16.36	4.98
Middle South Utilities*	19	16.26	2.86
Public Service Electric & Gas	20	16.18	3.95
Philadelphia Electric	26	12.50	2.70
Central Hudson Gas & Electric	27	12.44	4.43
Baltimore Gas & Electric	28	11.92	5.54
Southern Company*	29	11.11	3.00
Centel*	30	NA	NA
Wisconsin Public Service	36	9.77	4.27
Wisconsin Electric Power	37	9.57	4.35
Otter Tail Power	38	9.37	3.50
Hawaiian Electric*	39	9.22	2.25
Houston Industries*	40	8.76	3.85
Delmarva Power & Light	46	7.35	2.63
Southwestern Public Service	47	7.29	2.65
Union Electric	48	6.77	2.84
Texas Utilities*	49	6.41	4.15
Minnesota Power	50	6.28	4.06
Orange & Rockland Utilities	56	4.55	2.76
FPL Group (FP&L)*	57	4.38	2.62
Wisconsin Power & Light	58	3.78	4.12
Northern States Power	59	3.57	5.80
Kansas Power & Light	60	3.00	4.80
Allegheny Power System*	66	1.98	3.61
Pennsylvania Power & Light	67	1.96	3.12
Eastern Utilities Associates*	68	1.79	2.85
Interstate Power	69	1.25	2.43
Ipalco*	70	1.20	4.22
Detroit Edison	76	-0.45	2.20
Central Illinois Light	77	-1.64	2.82
Iowa-Illinois Gas & Electric	78	-1.67	4.13
Montana-Dakota Utilities	79	-3.88	3.76
United Illuminating	80	-4.76	5.40
Oklahoma Gas & Electric	86	-7.84	2.47
Atlantic Electric	87	-8.05	3.20
Public Service of New Mexico	88	-11.90	3.11
Public Service of New Hampshire	89	-11.96	3.07
Cincinnati Gas & Electric	90	-16.67	2.45
Utah Power & Light	96	-25.52	1.78
Montana Power*	97	-51.42	2.06
Consumers Power	98	-63.46	1.14
Public Service of Indiana	99	-76.23	1.06
Portland General Electric	100	NA	NA

*Denotes holding company.

SALES DATA

Company	1984 Total Sales (KWH) Rank	% Increase	Average Annual Growth 1979 – 1984	1984 Sales (KWH) By Type of Customer (% of Sales) Resid.	Comm.	Indus.	Other	Average Annual Residential Use 1984	1983	Ratio of Long-Term Debt to Net Plant 1984	1983
Southern Company*	6	12.23	3.72	22.1	17.6	33.7	26.7	10,437	10,404	47.6	49.7
TNP Enterprises* (Tex-NM Power)	7	12.08	3.48	26.8	19.4	51.6	2.2	10,372	9,757	37.2	41.5
Southern Indiana Gas & Electric	8	11.48	1.13	21.7	17.3	34.2	26.8	10,704	10,874	46.8	46.2
Wisconsin Power & Light	9	11.12	1.41	25.9	14.8	27.2	32.1	8,064	8,193	38.6	39.1
Southwestern Public Service	10	10.45	3.88	14.2	15.3	41.4	29.1	7,630	7,485	40.2	42.3
Nevada Power	16	8.80	0.83	43.4	2.9	46.6	7.1	13,812	13,445	44.2	42.3
Public Service of New Hampshire	17	8.64	0.34	28.0	12.0	28.1	31.9	7,087	6,944	47.3	44.8
Public Service of Colorado	18	8.63	1.36	29.2	47.5	17.4	5.9	6,268	6,076	37.5	38.7
Houston Industries*	19	8.19	1.09	24.1	18.3	51.4	6.2	12,620	11,759	39.4	38.1
Empire District Electric	20	7.99	2.67	29.2	18.7	23.2	28.9	9,590	9,266	42.0	43.9
Central Louisiana Electric	26	7.40	–1.19	39.4	18.7	34.0	8.0	11,262	10,836	37.4	36.6
New England Electric*	27	7.23	0.80	34.8	30.2	25.0	10.0	6,323	6,213	54.8	53.6
Niagara Mohawk Power	28	6.78	0.85	24.1	26.3	30.2	19.4	7,104	6,887	45.5	44.4
Kansas City Power & Light	29	6.66	0.10	29.8	40.6	25.8	3.7	8,327	8,774	113.6	88.5
Idaho Power	30	6.61	5.76	22.2	11.1	23.8	42.8	15,342	14,066	43.3	43.2
Toledo Edison	36	5.81	–1.50	26.0	18.5	45.6	9.9	8,045	7,900	108.2	95.3
Southern California Edison	37	5.71	0.13	28.9	32.3	30.2	8.6	6,147	5,879	44.9	44.9
Montana Power*	38	5.56	–1.06	23.7	34.2	19.7	22.4	9,053	8,422	45.4	45.5
Pacific Gas & Electric	39	5.54	0.09	32.7	32.6	25.4	9.3	6,557	6,386	78.0	78.8
Delmarva Power & Light	40	5.45	1.03	27.1	25.0	30.9	17.0	8,283	8,109	42.2	43.0
Public Service of Indiana	46	5.13	–0.62	28.0	21.0	34.9	16.1	10,843	10,479	74.3	72.2
Middle South Utilities*	47	5.09	–1.95	30.3	19.8	42.4	7.4	11,307	11,060	51.4	49.1
Savannah Electric & Power	48	5.06	–1.18	41.0	29.8	25.2	3.9	10,357	10,148	47.2	54.3
Wisconsin Public Service	49	5.01	1.44	25.8	23.4	31.1	19.7	7,269	7,219	32.8	34.4
Cincinnati Gas & Electric	50	4.88	1.23	34.6	23.7	31.2	10.4	9,937	9,889	52.6	46.8
Potomac Electric Power	56	4.45	3.09	24.6	42.1	24.0	9.3	9,362	9,246	43.2	46.4
Scana Corp.* (SCE&G)	57	4.37	1.44	31.1	24.9	34.4	9.6	12,081	12,009	40.7	39.3
Carolina Power & Light	58	3.84	1.55	25.7	17.7	33.1	23.5	11,891	11,889	40.6	41.8
Cleveland Electric Illuminating	59	3.82	–2.51	25.7	26.5	46.3	2.5	6,646	6,608	44.8	40.7
Public Service of New Mexico	60	3.47	4.82	20.3	27.0	12.1	40.7	6,022	5,915	46.9	51.0
United Illuminating	66	2.94	–0.66	34.5	36.3	27.6	1.5	6,293	6,336	51.5	38.5
Centel*	67	2.81	0.20	27.1	26.7	20.8	25.4	6,794	6,851	NA	NA
Public Service Electric & Gas	68	2.69	0.80	26.5	39.4	32.6	1.5	5,543	5,602	41.1	39.5
Interstate Power	69	2.69	0.13	22.9	17.7	52.6	6.8	7,132	7,373	47.4	48.5
Kentucky Utilities	70	2.64	0.95	31.7	20.3	19.1	28.9	10,873	10,724	37.8	41.4
Arizona Public Service	76	2.36	2.02	33.2	34.4	19.6	12.8	10,355	10,357	38.8	41.0
Montana-Dakota Utilities	77	2.36	4.16	41.2	23.9	31.1	3.8	7,986	7,900	41.9	42.8
Consolidated Edison	78	2.28	1.59	25.5	59.7	4.1	10.8	3,391	3,427	36.2	37.8
Eastern Utilities Associates*	79	1.98	0.15	33.5	30.9	23.8	11.8	5,694	5,708	53.2	51.5
FPL Group* (FP&L)	80	1.57	3.15	47.9	37.3	7.5	7.3	10,520	10,745	43.1	40.4
Pacificorp*	86	0.35	1.31	28.0	21.2	30.2	20.5	12,289	11,709	52.2	53.9
Dayton Power & Light	87	0.23	0.01	36.5	21.7	31.3	10.5	9,786	9,694	49.5	49.3
Central Illinois Public Service	88	–0.06	–0.11	25.8	11.1	39.1	24.0	8,423	8,671	39.8	37.3
Madison Gas & Electric	89	–0.11	–2.18	26.5	47.9	5.1	20.4	6,085	6,388	41.0	39.7
Dominion Resources*	90	–0.21	2.29	35.2	26.0	17.6	21.2	11,181	11,176	48.2	46.4
Northern Indiana Public Service	96	–3.21	–1.58	17.2	3.8	73.7	5.3	6,670	7,038	44.4	49.1
Midwest Energy*	97	–3.29	–0.47	36.1	26.1	26.6	11.2	7,116	7,744	4.8	48.8
Otter Tail Power	98	–7.81	4.18	25.4	14.9	36.6	20.1	10,059	9,862	37.6	37.8
Boston Edison	99	–9.20	1.27	24.6	48.8	15.9	10.7	5,551	5,407	40.1	45.6
Portland General Electric	100			Did not provide data after three requests.							

*Denotes holding company.

in the Northwest, where power costs are relatively low, and in the West, South and Southeast, where summers are long and/or where humidity increases the discomfort level. Leaders were: 1) Idaho Power, 151,342 kWh (+9.1 percent); 2) Washington Water Power, 14,854 kWh (+4.9 percent); 3) Puget Sound Power & Light, 14,259 kWh (+2.0 percent); 4) Nevada Power, 13,812 kWh (+2.7 percent); and 5) Gulf States Utilities, 12,901 kWh (+6.6 percent).

Conversely, utilities at the other end of the scale, those reporting the lowest average annual residential usage, tended to be located in areas where rates were high. Companies posting the lowest uses were: 99) Consolidated Edison, 3,391 kWh (-1.1 percent); 98) San Diego Gas & Electric, 5,407 kWh (+0.5 percent); 97) Public Service Electric & Gas, 5,543 kWh (-1.2 percent); 96) Boston Edison, 5,551 kWh (+2.7 percent); and 95) Duquesne Light, 5,768 kWh (0.3 percent).

TABLE I
THE TOP 10 IN KWH SALES

1	1	Southern Company	114,485	12.23
2	2	American Electric Power	112,320	14.30
3	3	Texas Utilities	69,128	10.23
4	5	Pacific Gas & Electric	63,343	5.84
5	6	Southern California Edison	63,310	5.71
6	4	Commonwealth Edison	63,298	3.40
7	7	Houston Industries (HL&P)	59,749	8.19
8	8	Duke Power	54,399	0.46
9	9	Middle South Utilities	52,990	5.09
10	10	FPL Group (FP&L)	49,351	1.57

Revenues up solidly

Total revenues of the Top 100 investor-owned electric companies climbed a solid 15.7 percent in 1984, a marked improvement from a year earlier when the gain was the smallest in more than a decade. Total 1984 revenues, which reflect all revenues, from all sources, received by utilities or their holding company parents were $152.7 billion, solidly ahead of 1983 performance, when the Top 100 utilities posted total revenues of $132.0 billion and a total revenue gain of 7.0 percent. The 1983 improvement was based largely on rate increases since kWh sales were up just a bit more than 2.0 percent.

For 1984, the nation's larger utilities again profitted from the effects of rate increases, but they came on top of stronger sales performances as well.

In the past year a number of new holding companies were formed to operate electric utilities and at the same time allow pursuit of other businesses beyond the regulation of state commissions. Twenty-six companies among the Top 100 now are considered to be holding companies. In all cases, electric utility operation remains the primary business. In some cases, electric utility operation remains the sole business.

Only five utilities reported decreases in total revenues, and three of these also suffered declines in kWh sales from their 1983 levels.

The largest revenue gains were posted by TNP Enterprises [formerly Texas-New Mexico Power] (+75.5 percent) on the strength of both a rate increase and a 12 percent increase in kWh sales; Kansas Power & Light

(+60.5 percent) largely on the strength of first full year results of its Gas Service Co. operation and rate relief granted in mid-1983; and Puget Sound Power & Light (+26.8) on the basis of rate actions and stronger retail sales results. KP&L was the leader in revenue growth a year ago on the strength of its acquisition of Gas Service Co. in the fall of 1983.

Companies at the opposite end of the scale included: Arizona Public Service (-7.4 percent) as a result of disposing of its gas properties and a small kWh sales increase; Central Illinois Public Service (-1.6 percent) as a result of declines in both electric and gas customers, a return to more

TABLE II
THE TOP 10
TOTAL REVENUES

1984 Rank	1983 Rank	Company	Revenues ($ Millions)	% Change
1	1	Pacific Gas & Electric	$7,830	17.8
2	3	Southern Company	6,124	13.0
3	2	Consolidated Edison	5,728	3.9
4	6	American Electric Power	4,882	13.4
5	4	Commonwealth Edison	4,830	6.4
6	5	Southern California Edison	4,801	9.7
7	7	Public Service Electric & Gas	4,196	9.9
8	10	FPL Group (FP&L)	3,940	17.6
9	9	Texas Utilities	3,822	12.7
10	8	Houston Lighting & Power	3,674	4.3

normal weather during the peak pricing period and stabilization of the area's economy; and Dominion Resources (-0.3 percent), which suffered a slight decrease in revenues as a result of a slight falloff in kWh sales resulting from loss of two wholesale customers.

A total of 48 companies reported revenues in excess of $1-billion for 1984, an increase of six companies from 1982 and 1983. The ten largest revenue producers are shown in Table II and are the same as a year ago, with only minor shifts in rank.

Net income for common up

With revenues up more than 15.0-percent, construction activity and construction financing declining and almost universal efforts to stimulate productivity and control operating expenses, net income available for common stock grew even more rapidly. Net income of the 98 reporting utilities, at $17.6 billion, was 21.2 percent ahead of 1983, when the total for the 100 reporting companies was $14.6 billion.

Significantly, the 21.2 percent gain in the reported 1984 net incomes of the 98 reporting is the second highest in more than a decade and is a continuing testimonial to the cost-control efforts of company managements. Highest rate of income growth was in 1982, when the overall gain was 22.2 percent. This past year, in addition to a high rate of growth, there appears to have been an improvement in the quality of many of the companies' reported net incomes. This resulted from reduced allowances for funds used during construction as large, long-term construction projects were completed or were winding down. AFUDC, while increasing income figures, represents paper profits and is a non-cash contributor to a company's financial position.

Overall, 83 companies reported increases in net income in 1984, 16 companies reported decreases and one company reported the same income in 1984 as a year previous. A year ago,

FINANCIAL STATISTICS

Company	Net Income Rank	Net Income % Gain	Revenues Rank	Revenues % Gain	Sales (KWH) Rank	Sales (KWH) % Gain	Int. Cov. Ratio 1984	Int. Cov. Ratio 1983	Earnings Per Share $ 1984	Price/Share 1984 (Dollars) High	Price/Share 1984 (Dollars) Low	% Change Long-Term Debt '83-'84
Boston Edison	6	39.6	4	22.9	100	-8.2	1.93	0.76	4.85	35.500	24.875	-0.11
Louisville Gas & Electric	7	38.4	64	6.8	84	0.7	1.88	1.11	3.79	28.500	22.625	-1.51
New York State Electric & Gas	8	38.1	11	13.6	9	17.8	1.23	1.15	3.68	23.000	14.750	19.58
Central Louisiana Electric	9	37.0	39	6.7	27	7.4	1.80	1.48	3.62	22.250	17.625	27.95
Middle South Utilities*	10	34.5	43	0.1	48	5.1	1.11	0.95	2.88	14.750	9.250	16.79
Iowa Electric Light & Power	16	28.9	67	5.3	92	-0.3	1.21	0.92	2.41	18.375	14.250	-6.52
Ohio Edison	17	27.6	46	8.0	13	9.9	0.80	0.73	2.50	14.125	9.375	14.82
Philadelphia Electric	18	27.4	12	14.8	22	8.6	1.82	1.63	2.70	16.000	8.000	11.71
Carolina Power & Light	19	26.5	22	12.6	99	3.8	1.38	1.24	3.81	28.125	19.250	11.38
Teco Energy	20	24.8	60	5.9	23	7.8	2.18	1.88	3.72	30.500	24.000	19.75
Central Vermont Public Service	26	22.7	44	8.1	42	5.4	2.62	2.26	3.19	17.250	10.875	10.02
Southern Company*	27	21.9	10	13.0	7	12.2	1.45	1.18	2.00	18.875	14.375	5.78
Toledo Edison	28	20.7	36	9.7	37	6.8	0.85	0.89	3.70	18.875	13.375	12.71
Houston Industries*	29	20.6	71	4.7	20	8.2	1.62	1.37	3.85	22.500	17.625	10.60
El Paso Electric	30	20.6	38	8.8	25	7.6	1.26	1.37	2.88	14.500	10.000	32.40
Eastern Utilities Associates*	36	18.5	6	19.5	80	2.0	0.84	0.80	2.65	18.000	12.500	12.67
Union Electric	37	17.2	91	0.8	65	3.4	1.31	1.27	2.84	16.500	12.000	16.70
Kansas Gas & Electric	38	15.7	73	4.5	75	2.5	2.82	3.08	3.07	19.000	12.500	32.88
Baltimore Gas & Electric	39	14.9	80	7.5	44	5.3	1.87	1.65	5.54	40.625	30.000	1.58
Otter Tail Power	40	14.3	85	5.6	99	-7.8	1.42	1.26	3.50	28.375	23.000	-1.60
American Electric Power*	46	13.9	16	12.4	6	14.3	0.97	0.87	2.85	21.375	15.125	-2.43
Hawaiian Electric*	47	13.8	48	7.7	74	2.6	1.21	1.10	2.25	21.250	15.380	2.38
Public Service of New Mexico	48	13.5	23	12.0	61	3.5	0.87	0.89	3.11	26.625	19.500	2.82
Illinois Power	49	13.4	94	0.2	57	4.4	2.04	2.23	4.02	23.875	17.625	16.30
FPL Group* (FP&L)	50	13.3	9	17.6	81	1.6	0.98	0.89	2.62	22.875	17.625	11.80
Missouri Public Service	56	11.4	90	0.9	72	2.6	1.40	1.29	3.11	19.750	15.250	-3.26
Wisconsin Electric Power	57	11.0	89	1.2	52	4.7	2.60	2.04	4.36	33.625	25.250	-6.86
Minnesota Power	58	10.9	27	11.6	4	19.4	1.52	1.44	4.06	30.000	23.750	13.24
Madison Gas & Electric	59	10.8	83	2.7	98	-0.1	1.87	1.46	2.86	22.875	18.750	6.17
Wisconsin Public Service	60	10.7	86	2.3	50	5.0	2.48	1.98	4.27	32.875	24.250	-5.23
Duke Power	66	8.4	25	12.0	66	0.5	1.60	1.60	3.96	30.125	22.250	-0.34
Consolidated Edison	67	8.3	76	3.9	70	2.3	3.24	3.01	4.48	31.250	22.625	-1.80
Orange & Rockland Utilities	68	8.2	87	2.3	16	8.9	1.50	1.40	2.76	25.375	19.250	0.00
Wisconsin Power & Light	69	7.9	82	3.6	10	11.1	2.28	2.13	4.12	30.875	25.625	4.51
Pennsylvania Power & Light	70	7.9	3	25.2	35	6.2	1.01	1.18	3.12	25.625	19.500	9.10
Northern States Power	76	5.0	72	4.7	83	1.2	2.23	2.00	5.80	44.250	33.625	5.18
Interstate Power	77	4.4	53	7.0	70	2.7	1.25	1.29	2.43	19.375	15.875	-0.09
Allegheny Power System*	78	3.9	96	-0.2	78	2.5	1.41	1.42	3.61	30.000	24.625	3.33
Northern Indiana Public Service	79	2.4	85	2.3	97	-3.2	0.80	0.80	1.63	16.125	11.125	-4.76
Iowa-Illinois Gas & Electric	80	2.3	78	10.7	93	-0.4	1.39	1.28	4.13	28.625	21.500	-0.18
Iowa Resources*	86	-3.6	68	5.2	94	-0.9	1.46	1.77	4.12	30.375	25.000	6.00
Oklahoma Gas & Electric	87	-4.2	94	5.8	95	-2.0	1.78	2.01	2.47	23.500	19.125	-2.01
Atlantic Electric	88	-6.5	57	6.3	67	3.5	1.40	1.59	3.39	26.000	19.875	1.59
Central Maine Power	89	-10.2	29	13.0	28	7.8	0.72	0.87	1.89	14.750	8.750	27.53
Kentucky Utilities	90	-11.7	78	3.8	71	2.6	1.24	1.34	3.03	25.000	20.375	-6.72
Consumers Power	96	-59.8	37	8.8	55	4.5	0.24	0.84	1.14	16.125	4.125	4.41
Puget Sound Power & Light	97	-71.3	2	26.8	53	4.6	0.21	0.83	1.53	15.000	9.250	5.05
Public Service of Indiana	98	-74.8	74	4.2	47	5.1	0.31	1.50	1.08	13.250	6.875	0.00
Centel*	98	11.1	88	NA	69	2.8	NA	NA	NA	NA	NA	NA
Portland General Electric	100	Did not provide data after three requests.										

*Denotes holding company.

ALPHABETICAL LISTING OF COMPANY PERFORMANCES

Company	Electric Sales Rank	Electric Sales KWH Sales (millions)	Customers Served Electric Total (1000's)	Customers Served Electric % Gain	Customers Served Gas Total (1000's)	Customers Served Gas % Gain	Revenues Total $ (1000's)	Revenues % Electric	Revenues % Gas	Net Income After Tax $ (1000's)
Boston Edison	49	11,739	596,797	1.3	0	NA	1,316,868	94.7	0.0	74,811
Carolina Power & Light	18	32,072	821,859	3.3	0	NA	1,854,250	100.0	0.0	246,174
Cengi*	94	2,831	134,339	0.4	0	NA	180,115	99.2	0.0	NA
Central & South West*	11	48,009	1,493,700	2.6	0	NA	2,786,156	98.2	1.8	317,222
Central Hudson Gas & Electric	77	5,460	225,305	3.0	48,629	2.1	523,189	86.9	13.1	44,878
Cincinnati Gas & Electric	40	15,682	614,335	1.2	367,847	0.4	1,419,179	63.6	36.4	104,382
Cleveland Electric Illuminating	37	17,273	714,768	0.3	0	NA	1,215,353	98.8	0.0	248,279
Commonwealth Edison	6	61,295	3,010,951	0.7	0	NA	4,920,671	100.0	0.0	761,162
Commonwealth Energy System*	76	6,110	296,000	3.1	206,000	1.5	708,508	65.8	34.2	31,941
Consolidated Edison	17	32,411	2,795,022	0.8	1,020,126	0.2	5,728,831	80.5	13.3	501,296
Duke Power	8	54,399	1,395,710	2.8	0	NA	2,710,015	96.5	0.0	399,545
Duquesne Light	50	11,563	560,298	0.8	0	NA	861,776	99.1	0.0	134,839
Eastern Utilities Associates*	90	3,600	235,000	0.9	0	NA	361,325	100.0	0.0	30,053
El Paso Electric	87	4,036	206,903	4.1	0	NA	329,015	99.6	0.0	94,971
Empire District Electric	93	2,912	106,065	1.9	0	NA	124,395	99.6	0.0	14,700
Houston Industries*	7	59,748	1,312,108	3.0	0	NA	3,674,556	100.0	0.0	355,522
Idaho Power	42	15,433	268,989	1.4	0	NA	427,847	100.0	0.0	86,418
Illinois Power	41	15,465	533,352	0.7	381,710	−0.2	1,280,537	63.3	36.7	235,478
Interstate Power	89	3,852	150,639	−0.1	45,013	.0	318,415	65.8	34.2	21,224
Iowa Electric Light & Power	84	4,206	204,712	0.1	133,165	0.4	468,228	63.5	35.0	30,023
Kansas Power & Light	61	8,469	286,940	1.3	1,000,718	1.3	1,480,182	34.0	66.0	80,089
Kentucky Utilities	53	10,884	378,199	1.3	0	NA	530,904	99.5	0.0	56,287
Long Island Lighting	45	13,995	936,964	1.3	402,430	0.4	1,973,550	81.4	18.6	340,264
Louisville Gas & Electric	63	8,010	302,061	1.1	233,771	0.3	679,536	64.1	35.5	69,502
Madison Gas & Electric	98	2,047	103,030	1.7	71,886	2.5	219,862	56.8	42.9	17,914
Montana-Dakota Utilities	99	1,855	113,751	−0.1	178,802	0.9	357,242	32.2	67.8	30,921
Nevada Power	73	6,187	224,632	4.8	0	NA	318,102	100.0	0.0	38,628
New England Electric*	36	18,256	1,122,930	1.9	0	NA	1,485,727	98.2	0.0	151,601
New York State Electric & Gas	44	14,445	692,811	1.4	130,928	0.4	1,129,088	81.6	18.4	184,006
Niagara Mohawk Power	14	37,086	1,405,000	0.9	436,000	0.7	2,785,546	76.6	23.4	308,274
Orange & Rockland Utilities	86	4,134	219,026	1.9	93,265	1.4	537,985	73.4	26.1	34,431
Otter Tail Power	91	3,316	122,001	0.3	0	NA	172,312	100.0	0.0	19,639
Pacific Gas & Electric	4	63,334	3,696,179	2.6	3,020,803	2.4	7,829,703	65.9	34.1	810,576
PacifiCorp*	27	24,430	655,700	0.8	0	NA	1,786,100	56.5	0.0	157,074
Pennsylvania Power & Light	26	24,498	1,039,381	1.3	0	NA	1,562,782	99.6	0.0	225,758
Public Service of Indiana	38	18,561	549,632	0.9	0	NA	910,276	100.0	0.0	56,978
Public Service of New Hampshire	70	6,841	314,332	4.1	0	NA	525,585	97.6	0.0	115,617
Public Service of New Mexico	72	6,317	243,864	4.5	0	NA	445,328	98.6	0.0	93,288
Puget Sound Power & Light	39	15,893	606,633	3.1	0	NA	657,235	100.0	0.0	22,004
Rochester Gas & Electric	69	7,164	302,190	1.6	236,949	1.6	783,856	60.8	37.2	103,618
Southern Company*	1	114,485	2,800,532	2.8	0	NA	6,123,985	99.3	0.0	719,669
Southern Indiana Gas & Electric	81	4,615	106,952	1.4	64,561	1.1	281,957	68.1	31.9	30,563
Southwestern Public Service	43	15,009	347,896	1.7	0	NA	813,767	99.7	0.0	103,882
Tipo Energy	51	11,331	383,083	5.0	0	NA	716,600	99.4	0.0	97,600
Texas Utilities*	3	69,126	1,913,791	7.0	0	NA	3,932,235	99.8	0.0	526,041
Utah Power & Light	34	18,582	490,949	2.5	0	NA	968,269	99.8	0.0	94,564
Washington Water Power	56	9,023	236,094	1.3	78,572	1.8	413,310	67.7	31.7	50,381
Wisconsin Electric Power	33	18,612	830,648	1.9	226,009	2.2	1,434,889	76.1	23.1	149,734
Wisconsin Power & Light	60	8,589	314,895	1.2	105,837	1.9	576,476	73.9	25.5	53,552
Wisconsin Public Service	67	7,470	297,638	1.8	157,022	1.7	644,191	62.9	37.1	50,481

*Operates holding company.

89 companies reported gains while 11 posted declines.

The median net income change was a 13.3 percent gain and was posted by FPL Group, the holding company that grew out of Florida Power & Light. A year earlier, median net income change was 7.9 percent.

EPS up 1%

Average earnings per share inched up slightly in 1984, to $3.27 per share. This represents a gain of just 1 percent from 1983. By way of comparison, the gain in average earnings per share in 1983 was $0.24, or 8.1 percent. In 1983 average EPS were $3.24, in 1982 EPS were $3.00 and in 1981 average EPS were $2.82.

TABLE III
THE TOP 10
NET INCOME AVAILABLE FOR COMMON STOCK

1	2	Pacific Gas & Electric	$810.6	29.0
2	1	Commonwealth Edison	761.2	9.6
3	4	Southern Company	719.7	21.9
4	3	Southern California Edison	650.4	6.8
5	5	Consolidated Edison	501.3	8.3
6	6	Texas Utilities	526.0	13.0
7	9	Middle South Utilities	506.4	34.6
8	7	American Electric Power	487.6	13.9
9	10	Public Service Electric & Gas	429.8	29.6
0	11	Philadelphia Electric	409.7	27.4

The small increase in per share earnings, in the light of the solid 21.2 percent improvement in net income, reflects the increased sale of common stock during the year.

The 1984 gain is well below the 12-year average. From 1972 through 1983, the total gain in per-share earnings was $0.72, or 2.3 percent per year. However, the large gain in 1983, one-third of the total 12 year increase, skews the average. The fact remains, however, that the per-share performance of most companies was quite unspectacular and is just two-thirds of the average for the 11-year period 1972-1982, after the large 1983 increase is removed.

For 1984, 72 companies reported gains in earnings and 26 utilities reported declines. This performance is off from a year ago, when 82 companies reported increase in EPS.

For the 98 companies reporting EPS, the median earnings growth was 6.41 percent, well below the 1983 median per-share growth of 9.63 percent. Median growth was 10.2 percent in 1982 and 10.4 in 1981.

As is typical in ranking companies on the basis of growth rates, those organizations coming off poor years tend to rise to the top of the list. This was generally true of the Top 100 utilities in 1984 as 9 of the top 25 utilities came from the bottom 25 a year earlier. But whereas those making recoveries normally have been grouped at the top of the list of fastest growing companies, in 1984 they were scattered fairly uniformly through the top 25 rankings. Four in the top 25 were in that same grouping a year earlier and 7 moved up from the second 25.

Conversely, utilities at the bottom of the 1984 EPS growth list tended to be losers or slow growers the previous year. They also tended to be companies with large construction projects that have gone sour or where PUC regulation has tended to be punitive.

EEI details utility diversification in new report

WASHINGTON, D.C.—According to a new Edison Electric Institute survey of 120 member utilities, 86 said they were invovled in at least one other business venture.

The EEI business diversification study of investor-owned electric utilities shows that fuel exploration and development ventures are the most popular type of diversification (26 percent of the companies). The least prominent business venture was identified as business services (one company). See accompanying table.

EEI's survey found that 34 different types of diversification exist among the 120 responding electric utilities. The top four categories of ventures, which include fuel exploration and development, real estate, energy conservation services and cogneration, represent over 50 percent of the total number of utility business ventures.

The responding utilities are involved in a total of 296 business ventures, said EEI. Of that number, 185 are structured as distinct subsidiaries of a parent utility or holding company. EEI said 35 percent, or 103 ventures, were regulated by either state or federal governments, or both.

Typically diversify

According to EEI, electric companies typically diversify either through a holding company, which may have both utility and non-utility subsidiaries, or through the utility operating company directly.

Utilities that organize through a holding company are under the jurisdiction of the Public Utility Holding Company Act (PUHCA) and are regulated by the Securities and Exchange Commission. Directly-owned operating companies are limited in their diversification by state utility statutes and commission policies.

Among the most popular forms of diversification are real estate ventures, energy conservation services, appliance sales and services, consulting services, fuel transportation and district heating.

Utilities also have set up businesses to sell computer software. Consolidated Edison, Florida Progress, Gulf Power, Iowa Public Service, Iowa Resources, Montana Power, Northern States Power and PacifiCorp all have ventures selling software.

(Popular Diversification Activities)
Based on 296 total responses

Venture Type	Percent of Total
1. Fuel Expl. & Develp.	26
2. Real Estate	13
3. Energy Cons. Serv.	8
4. Cogen./Sm.Pwr.Prod.	5
5. Appliance Sales/Serv.	5
6. Proj. Mgt./Consulting	5
7. Fuel Trans./Transload.	5
8. District Heating	3
9. Load Mgt. Controls	3
10. Computer Software Sales	3

Source: Business Diversification Activities of Investor Owned Electric Utilities./EEI

Other ventures

Some of the more unique forms of diversification reported in the survey include advertising sales, agriculture, business services and timber harvesting.

Kansas Gas & Electric said it has set up a business to sell advertising space in the company's monthly electric bill envelopes. The utility said revenue from the operation goes to offset other utility expenses.

Florida Power & Light owns and manages an orange grove as a non-utility business. The state public utilities commission has not permitted the venture in the rate base.

Florida Progress formed a subsidiary of 300 employees called Better Business Systems. The company designs and manufactures business forms, envelopes, letterhead and packaging materials. It also sells computer-related supplies and accessories.

Three utilities answering the survey—American Electric Power, Duke Power and Florida Power—are involved in timber harvesting. AEP said the land management departments of its operating companies harvest timber from land newly cleared for utility use. Crescent Land & Timber Corp. was formed by Duke Power in 1969 to use non-utility land for harvesting and restoration. Florida Power also sells timber from company-owned land.

American Electric Power reported it has 15 ventures, while Public Service Electric & Gas Company (N.J.) said it has 12. Wisconsin Power & Light has 10 business ventures and Alabama Power reports nine.

Northern States Power and Montana Power each have eight ventures, according to the survey.

For additional information on EEI's *Business Diversification Activities of Investor-Owned Electric Utilities*, contact EEI at (202) 828-7582.

MAC survey finds strong interest in cogeneration

SAN DIEGO—A telephone survey taken by Management Analysis Company (MAC) of 83 electric utilities operating fossil-fueled plants shows a strong interest in cogeneration.

MAC said 57 percent of the utilities surveyed would consider operating a cogeneration plant. The survey also revealed that about one-third of the companies have performed an analysis of the impact of cogneration and decided it is a viable alternative fuel source.

For more information, call MAC at (619) 481-3100.

ONLY THE LOADER/BACKHOE LEADER GETS DOWN IN THE TRENCHES WITH YOU.

Only one company does the whole job at the jobsite by filling your loader/backhoe and your trencher needs, too.

And that company, Case, has more firsts to its credit than any other in the industry.

In 1957 we introduced the first integral loader/backhoe from a single manufacturer. And the innovations we've introduced since have made us and kept us number one.

We're continuing our leadership with a pace-setting line of trenchers including the new 50-horsepower DH4B, which trenches up to 16 inches wide and 72 inches deep. Hydrostatic drive permits smooth forward, reverse and variable speed trenching control, and flywheel design gives you the extra torque for really tough going.

One-hand Mono-Stick, with infinitely variable speed control, makes the DH4B easy to operate. Hydraulic articulation makes it easy to maneuver. And a full line of attachments makes it easy to add on versatility.

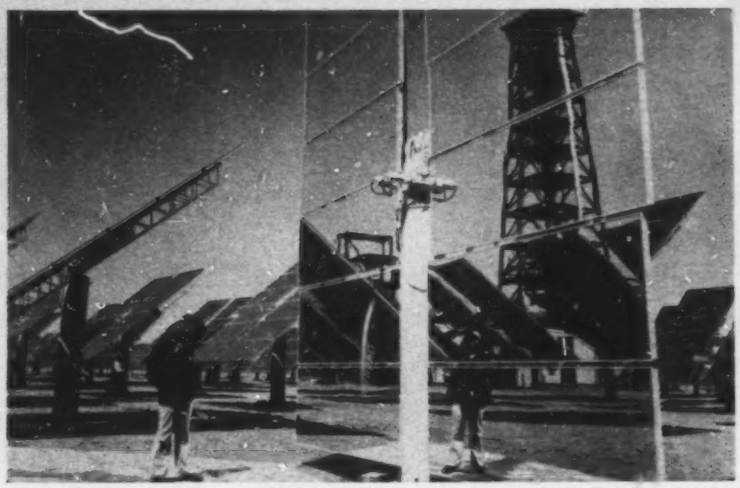
Only Case gives you so much, plus one-source trencher and loader/backhoe service and computerized parts support.

J I Case
A Tenneco Company
700 State Street Racine, WI 53404 U.S.A.

case

Inquire R.S. 39

Windfarm operated by Fayette Manufacturing Corp. at Altamount Pass, California has more than 1450 wind turbines.



Heliostats at the pioneering, 10-MW Solar One solar thermal power plant reflect energy to the central boiler.

Can alternate energy live without tax credits?

Robert Smock
Managing Editor

Exotic energy development is at a crossroads.

Solar photovoltaic developers fear the infant industry will not survive loss of federal tax credits coupled with continued "low" oil prices. Several large projects were cancelled recently and two manufacturers dropped out of the business.

Wind energy is growing steadily and economics are improving but development has been limited to three sites in California which account for 95 percent of U.S. wind generation.

Other forms of alternate energy like solar thermal are surviving on federal government research subsidies. Others are limited to remote, unusual applications willing to pay the high costs (the "marijuana farm" market.)

The big breakthrough into large-scale commercial application, either for bulk energy production or decentralized application, has not occurred yet, and some industry observers wonder if it ever will.

Solar photovoltaics

According to consultant Paul Maycock, president of Photovoltaic Energy Systems Inc., Alexandria, Va., the future of the photovoltaic solar industry hinges on the tax credits. If the U.S. investment tax credits die at the end of this year (as scheduled), the world photovoltaic market will be dominated by the Japanese who will get 65 to 70 percent of the market, Maycock predicted. With Japanese domination, the module price will drop to about $2 a watt by 1995 (from today's $5) and the market will grow to about 400 MW, he added.

On the other hand, if U.S. tax credits are extended and expanded, Maycock forecast that U.S. manufacturers will remain dominant with a market share of about 50 percent. Module prices will drop to $2 a watt and the market can grow to a whopping 2000 MW in 1995.

Tax credits are needed because photovoltaic costs are still a factor of 3 to 3.5 away from being competitive economically, Maycock told the recent Energy Technology Conference in Washington, adding that they started at a factor of 30 to 40 away.

At today's PV prices the U.S. market is relatively saturated. Shipments by U.S. manufacturers dropped 10 percent, from 13.1 MW in 1983, to 11.7 MW in 1984, as shown in the table. Maycock attributed 5 MW of the 1984 shipments (and 9 MW in 1983) to tax-credit inspired sales, particularly in California. There, federal and state tax credits and fast write-offs provide an immediate 70 percent return of the installed cost. Maycock said fully half of U.S. manufacturers' 1984 sales were due to tax credit stimulation or government-supported sales.

Although he's a photovoltaic supporter, Maycock said it's not as good an investment as wind or cogeneration for a third-party investor, even though its high-tech reputation continues to lure venture capital. It will be a different story without the tax credits, said the consultant.

"If the tax credits expire we'll all be buying Japanese photovoltaics," warned Maycock. Japanese manufacturers are building on the market they currently dominate for tiny photovoltaic cells in watches, calculators, and other consumer gadgets. There's a big difference between this market and that of the U.S. suppliers. "They started with a market that was profitable," said Maycock.

The consultant claimed that Japanese processing technology is equal to or better than that of U.S. manufacturers and is being improved by an aggressive government development program.

Given rapidly improving technology and the advantage of experience in a competitive marketplace, the Japanese manufacturers have already started to take over the market, as shown in the table—their world market share rose from 23 percent in 1983 to 36 percent in 1984, almost entirely at the expense of U.S. manufacturers.

He noted that Japanese shipments increased 80 percent in 1984. Most of the growth, Maycock reported, was in the new, amorphous silicon technology. Amorphous silicon's market share rose from 14 percent in 1983 to 28 percent in 1984 at the expense of single crystal silicon technology whose market share dropped from 50 to 43 percent.

Maycock added that Japanese multi-kilowatt photovoltaic systems have started to show up in California at competitive costs.

Wind energy developers are also anxious about the federal tax credits,

Continued on page 40

WORLD PV MODULE SHIPMENTS

	1983		1984	
	MW shipped	Percent	MW shipped	Percent
United States	13.1	60.4	11.7	46.8
Japan	5.0	23.0	8.9	35.6
Europe	3.3	15.2	3.6	14.4
Other	0.3	1.4	0.8	3.2
Total	21.7 MW	100%	25.0 MW	100%

U.S. PV MODULE SHIPMENTS BY APPLICATION

Application	1983 MW	1984 MW
Third-party-financed (<5 kW)	4.5	3.0
Third-party-financed central station (1 MW +)	4.5	2.1
Exports	2.0	2.9
Off-the-grid residential	0.8	1.5
U.S. Government projects (SMUD, DOD)	0.7	1.2
Off-the-grid industrial and commercial	0.6	1.0
Total	13.1 MW	11.7 MW

U.S. PV MODULE SHIPMENTS BY COMPANY

	1983		1984	
	MW	Module	MW	Module
Arco Solar	6.0	Single	5.5	Single
United Energy	4.5	Conc.	3.0	Conc.
Solarex	1.3	Poly	2.1	1.5 Poly 0.5 Single[1] 0.1 A-Si
Solar Power	0.4	Single	0.0[2]	
Photowatt	0.3	Single	0.0[2]	
Solec Int'l	0.3	Single	0.4	Single
Solenergy	0.05	Single	0.1	Single
Motorola	0.1	Single	0.3	Poly
Mobil Solar	0.07	Ribbon	0.08	Ribbon
Other (Intersol, Entech, Chronar, Westinghouse, Tideland, Silicon Sensor)	0.05	60% Single 40% Conc.	0.2	20% Ribbon 40% Single 40% Conc.
Total	13.07 MW		11.68 MW	

JAPAN PV MODULE SHIPMENTS BY COMPANY

	1983		1984	
	MW	Module type	MW	Module type
Sanyo	2.0	A-Si	3.5	3.2 A-Si (Consumer) 0.3 A-Si (Terrestrial)
Fuji	0.8	A-Si	2.5	A-Si
Kyocera	0.4	Poly	0.65	0.6 Poly 0.05 A-Si
Sharp	0.8	Single	0.5	Single
ECD/Sharp	0.3	A-Si	0.4	A-Si
Hoxan	0.1	Single	0.3	Poly
Kaneka	–		0.3	A-Si on steel
Nippon Elec.	0.15	Single	0.2	Single
Hitachi	0.07	Single	0.15	Single
Komatsu	0.2	Single	0.1	Single
Mitsubishi	–		0.1	Single
Other (Toshiba, Taiyo Yuden, JSEC, Matsushita, Sumitomo, Mitaka)	0.2		0.2	50% Ribbon 50% A-Si
Total	5.02 MW		8.9 MW	

Source: "Photovoltaic Systems Technology, Cost and Performance to 1995," Paul Maycock, 12th Energy Technology Conference, 1985, Washington, DC.

Exotic energy . . . from page 38

but their technology appears to be closer to commercial competitiveness than photovoltaics.

Paul Gipe of Zond Systems, Inc., Tehachapi, Cal., a major wind machine manufacturer and wind farm operator, told the Energy Technology Conference, "Rapid expansion of the wind industry during 1985 will push the technology further towards commercial generating standards at costs competitive with more expensive conventional fuels. With continued growth the industry will soon reach maturity and wind energy will be competitive with existing energy resources. The industry's growth, however, is threatened by premature expiration of the federal energy tax credits."

Gipe reported substantial progress in wind machine technology since development started in the U.S. in the early 70s. An emphasis on reliability in design in the late 70s and early 80s is now beginning to pay off in improved capacity factors and reduced electricity generation costs. There's been dramatic improvement in capital costs which dropped from $3100 per kW for machines installed in 1981 to $1860 per kW for 1984.

Average machine size increased from about 50 kW in 1981 to between 80 and 100 kW this year.

Gipe said that capacity factors ranged from 5 to 25 percent for California wind machines in 1984 "with selected arrays during 1984 delivering 22 to 23 percent." He claims that 1984 was a poor wind year, so the outlook is good for the future. Annual capacity factor potential is in the 30 to 40 percent range, he claims.

Wind power is concentrated in California, Gipe reported. Wind energy generated in the state in 1984 totaled 195 million kWh (up from 6 million kWh in 1982.) That's 95 percent of the wind energy produced in the U.S. and 75 percent of the world's output, said Gipe.

He added that three firms operate wind farms that account for 58 percent of California's energy output: Zond, U.S. Windpower, and Fayette Mfg. Gipe noted that large corporations have largely abandoned wind power. Only Westinghouse, he claims, is still in the marketplace. He pointed out that the firm recently sold 15 600-kW units in Hawaii.

Unlike photovoltaics, wind power is still growing at a rapid rate. California had 609 MW of wind capacity installed at the end of 1984. Gipe predicted that will rise to 1000 MW by the end of this year.

Gipe repeated Maycock's plea for extension of the federal tax credits. "It's ironic," he told the conference, "that just as the industry nears maturity, growth may be sharply curtailed by expiration of the energy tax credits. Thought the prospect of wind energy improving its competitiveness against entrenched energy sources and becoming more cost-effective is good, there's little doubt that wind energy is at a disadvantage."

He said that wind energy tax credits have cost the U.S. treasury a "paltry" $175 million. Subsidies to other forms of energy development have totaled $162 billion over the past 60 years, he claimed. He added that if the $8 billion still allocated for synfuels were spent on wind energy tax credits it would support 28,000 MW of windpower.

Solar thermal

Speakers from DOE's Sandia National Laboratory brought the Energy Technology Conference up to date on the status of solar thermal technology. Unlike photovoltaics, in which sunlight shining on silicon is converted directly to electricity, solar thermal technology produces electricity by boiling a fluid and using a relatively conventional heat engine.

Solar thermal is still largely supported by government R&D spending. Only a few private ventures have been started.

There are two basic approaches: the central receiver in which a field of reflectors focuses energy at a central heat engine, and the distributed receiver approach in which there are heat-engine/receiver modules or troughs.

Sandia's Alan Skinrood described progress in DOE's central receiver program. The highlight has been the 10-MW Solar One plant connected to Southern California Edison's grid. The plant completed its startup and test phase last August and began a three-year power production phase.

The $120 million facility has exceeded its performance goals, Skinrood reported. It's achieved output levels of 10.4 MW on sunlight steam and 7.3 MW on storage steam. Designed to deliver 28 MWhr from storage (7 MW for four hours) it has achieved 43.4 MWhr from storage. Maximum energy output in one day has been 104 MWhr. Plant availability has averaged 90 percent.

The problem, as with all exotic energy sources, has been cost of electricity from Solar One. Skinrood reported that electricity production costs have been as high as $1.00 per kWhr in some months and as low as 30 cents per kWhr. The long term goal, he said, is 5 to 10 cents per kWh.

A promising development has been a recent drop in heliostat prices. Shown in the photo, the heliostats reflect the sunlight to the central receiver. Skinrood said that a long-term goal of the DOE program has been to reduce heliostat prices to $100 per sq meter. The Solar One heliostats cost $500 a sq meter. ARCO Power Systems Co., which supplied the Solar One units, recently offered to sell heliostats for $200 a sq meter, Skinrood said.

The distributed receiver technology has proven much more popular with private investors with a number of small industrial and commercial installations. Of interest is a 5 MW private project recently started up by LaJet Energy Co. Built near Warner Springs, Cal. the plant has 700 separate solar dishes. The plant has been in a startup phase since last summer, Skinrood reported. He said that the plant was sold to investors for an installed cost of $3600 per kW and he added that it should be able to produce electricity for a cost of 15 cents a kilowatt-hour.

NRC gives TMI-1 a favorable report

MIDDLETOWN, PA—GPU Nuclear received more good news in April after learning the Nuclear Regulatory Commission gave Three Mile Island Unit 1 high ratings in a new assessment of the plant.

GPU Nuclear said it received the highest rating possible in seven of the nine areas evaluated by the NRC. The NRC's Systematic Assessment of Licensee Performance (SALP) covered the period from Feb. 1984 through Jan. 1985.

"In a majority of the areas rated," said the NRC, "licensee management continued to be aggressive in problem resolution and involvement in promoting nuclear safety and radiation protection."

Areas receiving the highest ranking included shutdown plant operations, radiological controls, maintenance, preoperational test and surveillance, fire protection and housekeeping, emergency preparedness and security and safeguards.

Concerning emergency preparedness, the report said, "The licensee's commitment of substantial resources to the emergency preparedness program in the areas of staffing, training, management, facilities and equipment has provided a superior level of performance."

The NRC's SALP evaluation team recommended that GPU Nuclear meet with the NRC staff to establish priorities on licensing actions not related to restart.

Plant life extension projects announced

CINCINNATI—Cincinnati Gas & Electric announed that it will extend the life of three units at its Beckjord generating station.

Work on unit 3, a 1954 135—MW unit, will be done during a 14-week outage this fall at a cost of $11.5 million. Work on the other two units will be done in 1986 and 1987.

The company said it hoped to add 20 to 30 years to the normal 30- to 40-year life of the generating units.

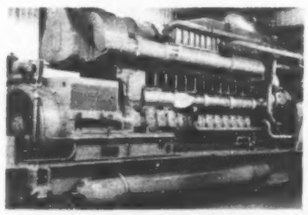
No one looks better than we do.

Over 35 years of experience go into every cost of service and rate study we do. So we're old hands at spotting every detail that could maximize your financial performance. And minimize your customers' problems. Is that the kind of expertise you want working for you in your next cost of service and rate study? Then it's time you gave us a better look.

CKM HIL

Inquire R.S. 18

Need more power? *Call the experts*



Haynes stocks current engines and support equipment for your power needs; Fairbanks-Morse, Cooper, E.M.D., and other engines are available for all applications.

Haynes is geared to meet most emergencies. Quickly dispatched service crews with in-depth diesel power experience can help minimize your expensive downtime.

The Adeco Fuel Systems Division with its precision equipment, such as the Merlin calibration stand, can increase efficiency and reduce the maintenance of your prime mover. Adeco's calibration of your system leads to faster pump installation, better combustion efficiency, optimal cylinder loading, reduced injector and power parts wear, rapid turnaround, and price incentives for complete engine sets.

Please write or phone for more details.

HAYNES Corporation
ADECO Fuel Systems
P.O. Box 179 / Jackson, MI 49204
(517) 764-5600 Telex: 230-223425 HAYNES ENG JKN

Haynes... the diesel power specialists

Inquire R.S. 19

$63,000,000 ANNUAL EXPENDITURES FOR FUEL, MAINTENANCE & OPERATIONS OF AN ON-LINE NUCLEAR UNIT

In keeping these costs reasonable standards make a big contribution. The American Nuclear Society is in the forefront of standards development. By becoming a member of the

INFORMATION CENTER ON NUCLEAR STANDARDS

you contribute to this very important endeavor. You also receive

- Monthly standard newsletter
- All ANS approved standards
- Opportunity to input on developing ANS standards
- Abstracts of U.S. and international standards
- Plus Nuclear News, Implementation Notes, research, help and more

Write today
AMERICAN NUCLEAR SOCIETY
555 North Kensington Ave.
La Grange Park, IL 60525
Telephone: 312/352-6611
Telex: 254635

Inquire R.S. 20